JOURNAL
OF THE
AMERICAN VETERINARY MEDICAL ASSOCIATION

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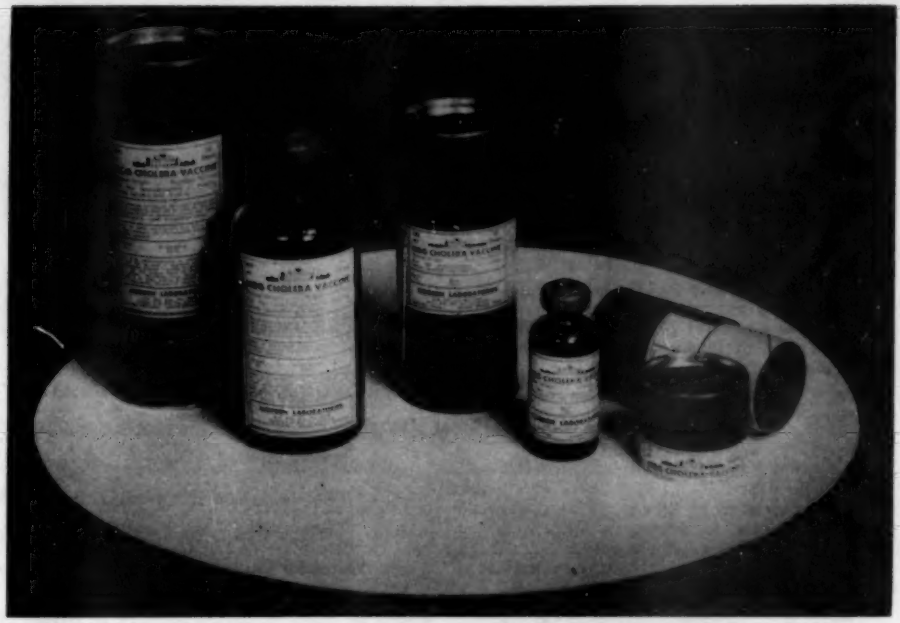

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$7.50 per annum Foreign $8.00: Canada $8.00 Single Copies 75 cts. prepaid in U. S.

Published monthly at 600 S. Michigan Ave., Chicago, Ill., by the American Veterinary Medical Association. Entered as second class matter August 10, 1932, at the Post Office at Chicago 5, Illinois, under the act of March 3, 1879. Additional entry at Mendota, Ill. Accepted for mailing at special rate of postage provided for in Section 538, act of February 28, 1925, authorized August 10, 1932. Reproduction of any part of this publication is prohibited, unless special permission is given. Permission will be given if the purpose seems justifiable and, in signed articles, if the rights or requests of author are not violated thereby. Reprints should be ordered in advance. Prices will be quoted after publication. Please send prompt notice of change of address, giving both old and new. Advise whether the change is temporary or permanent. Address all correspondence to American Veterinary Medical Association.

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AVMA ☆ Report

Veterinary Medical Activities

✦ Food and Milk Hygiene Committee Chairman, Dr. H. E. Kingman, Jr., and the following members, Drs. H. E. Helvig, C. H. Pals, and Harry E. Shepherd, met in the AVMA conference room on April 20, 1951, primarily to consider the revisions to the regulations governing the inspection and grading of poultry. Dr. Kingman was chosen to represent the Committee and the AVMA at hearings which were held by the USDA May 2, 1951, in Chicago. Dr. P. J. Brandly also attended the meetings.

★ ★ ★

✦ The central office is always striving to acquire new members, and during the year several hundreds of qualified nonmembers indicate an interest in AVMA membership. Every effort is made to help them get their applications completed. Each member can aid in this campaign by telling nonmembers in his locality or state the advantages of belonging to the AVMA and how more members will strengthen the AVMA and enable it to render even better service to all its members.

★ ★ ★

✦ Drs. W. A. Aitken, James Farquharson, and W. A. Hagan of the AVMA Council on Education met on May 4, 1951, with representatives of the AMA and ADA councils on education at the headquarters of the American Medical Association in Chicago to discuss problems of mutual interest. This was the third such meeting of representatives of the educational councils of the three associations held during the past year. Drs. J. G. Hardenbergh and C. D. Van Houweling of the AVMA staff also participated. . . . The AVMA Council on Education held its regular spring meeting on May 5, 1951, to review inspection reports and approval status of the schools.

★ ★ ★

✦ Dr. C. D. Van Houweling, assistant executive secretary, also serving as secretary of the AVMA Emergency Advisory Committee, spoke on May 10, 1951, to the Southern Minnesota Veterinary Medical Society, Austin, Minn., on the subject of civilian defense and biologic warfare.

★ ★ ★

✦ Dr. George W. Gillie, of Fort Wayne, Ind., former Representative from the Fourth Congressional District of Indiana, recently visited the AVMA office to discuss legislative action which the Association should undertake relative to amending the Officer-Personnel Act of 1947. The present act requires veterinarians to enter the Veterinary Corps as second lieutenants unless they have had at least one year of experience following graduation. Dr. Gillie will also explore the possibility of getting for veterinarians in the Armed Forces the $100 a month bonus pay which physicians and dentists in military service receive.

★ ★ ★

✦ Assistant Executive Secretary C. D. Van Houweling, who is serving as chairman of the AVMA Convention Program Committee, went to Milwaukee on April 20, 1951, with Mr. W. L. Lawrence, of Radio Corporation of America, and Mr. Herbert Sigler and Mr. John Jewett, representing Allied Laboratories, to make final plans for the closed circuit televising of portions of the AVMA program. Plans now are to have the televised portions of the program projected on a 16- by 20-foot screen.

★ ★ ★

✦ The Board of Governors (Drs. W. G. Brock, W. M. Coffee, and John R. Wells) held a two-day meeting at Association headquarters on April 20-21, 1951, for the purpose of interviewing prospects for the position of editor-in-chief. Other business also was transacted.

★ ★ ★

✦ President-Elect John R. Wells represented the Association at the annual meeting of the American Animal Hospital Association in Atlantic City, May 2-5, 1951.

★ ★ ★

✦ Dr. J. G. Hardenbergh, AVMA Executive Secretary, has accepted the appointment as veterinary medical consultant to the National Advisory Committee to Selective Service and the National Security Resources Board (*see* p. 411 for details).

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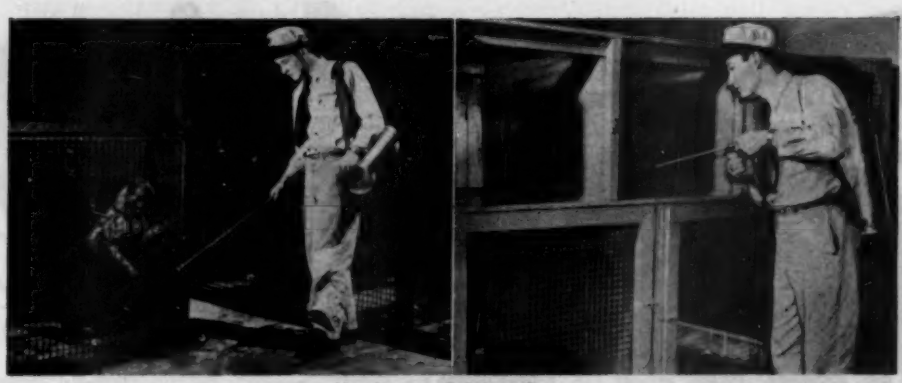

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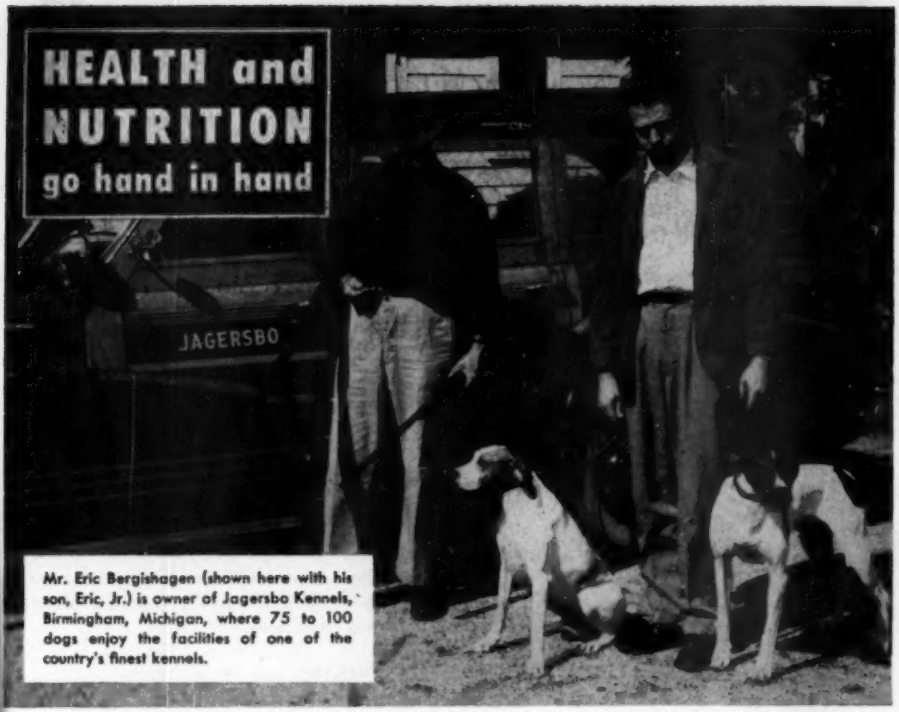

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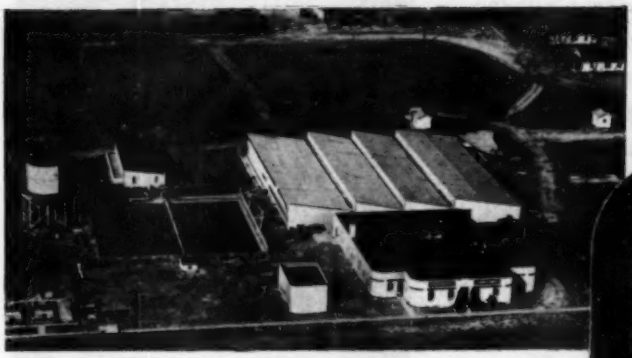

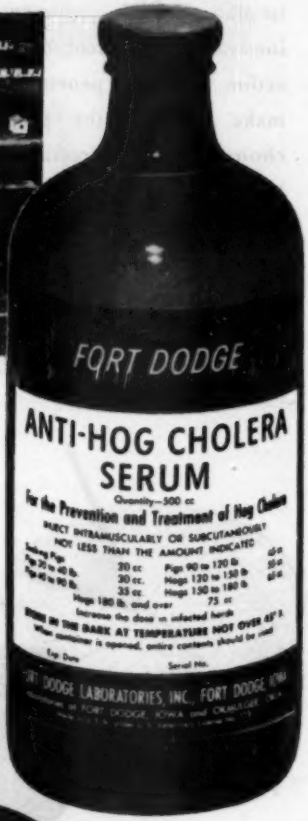
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VOL. CXVIII JUNE, 1951 NO. 891

Cytologic and Pathologic Effects of Ionizing Radiation of Interest to the Veterinarian

LIEUTENANT COLONEL JOHN H. RUST, V.C., U. S. ARMY

FOR THE VETERINARIAN to understand and to be able to evaluate the effects of nuclear energy upon the organism as a whole, an insight into the response of the cells is essential. Armed thus, he can consider the problem as related to the specific tissues, organs, organ complexes, and finally the animal as a whole. All are interrelated but, unfortunately, not well understood. The biophysicist is at a loss to give a rational interpretation of the effects the pathologist sees. Some of this is caused by a failure to understand the basic biochemistry of living organisms as well as a failure to understand the peculiar response of a cell exposed to radiation. Much has been done and is being done to remedy this situation but, actually, only a trifling start has been made. With this in mind, perhaps one can forgive what seem to be oversights or omissions.

It is not necessary to understand the physical properties of x-rays in this short description of how they transmit their energy to cells. A simple statement of fact is enough. Two methods of energy dissipation occur. In the first case, the ray is absorbed by an atom of a cell with the emission of an electron (by the photoelectric effect). If there is energy remaining, it may cause the emission of a second electron or, rarely, a long roentgen ray. This, in turn, is absorbed by another atom. So usually, two electrons are produced, each causing ionizations as it moves through the cell population until it has spent its energy. These cause many molecular changes, as mentioned earlier. A second method is by the Compton effect in which the ray strikes an electron and is energized in a recoil action. This electron may also produce ions as it travels. The first method described takes place with the softer x- and *gamma* rays and both are utilized with the hard rays.

Absorption of short *gamma* rays is almost entirely by the Compton effect, which was previously described (April, 1950, JOURNAL, pp. 229-234). The electrons produced have considerable energy and have greater range and ionizing power than similar ones produced by softer x-rays.

Beta particles (electrons) produce their effect as do the x- and *gamma* rays, the difference being that they are produced externally and not within the internal tissues. Electrons, being light in weight, are easily deflected from their course and can not penetrate deeply. The result is that their effect is not felt in the deeper tissues unless they are taken internally. This depth of penetration is somewhat greater than that of *alpha* particles.

Alpha particles have a very short range but a high degree of ionization per centimeter of free path. The deeper tissues also are not bothered by these particles unless taken internally. Effects are produced by accelerated electrons from atoms within tissues. An interesting method suggested for the use of *alpha* particles in medicine

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This is the third of a series of five articles on atomic energy by Colonel Rust.

is infiltrating tumors with lithium or boron and then bombarding them with slow neutrons. A rich yield of *alpha* particles is produced. It is believed that this may have important clinical applications because the action can be confined to small spaces.

Protons accelerate electrons from the atoms within a cell population much in the same manner as do x-rays and *gamma* rays. Generally speaking, protons are unimportant, except in very special circumstances.

Neutrons, for our purpose, are of two types. Their effects are produced in two ways. Fast neutrons accelerate protons, which in turn accelerate electrons. The electrons bring about ionization. In addition, carbon, oxygen, and other tissue atoms have their nuclei accelerated, and they also produce ions. This effect is of minor importance and is usually ignored. Slow neutrons are captured by the various nuclei of atoms within cells. Depending upon the nature of the atom concerned, an *alpha* particle, an electron, a proton or a *gamma* ray is emitted. These secondary particles then produce ionizations. Effects from slow neutrons may also be due to the chemical changes brought about by transmutation or ionization. So far, little work has been done in the field of radiation effects of neutrons upon biologic materials because of the difficulties in obtaining a satisfactory source of neutrons.

CELL DAMAGE

The radiation and particle emissions with which we are most concerned are roentgen and *gamma* rays, and *alpha*, electron (*beta*), proton, and neutron particles. For the most part, all of these bring about this distinctive action upon cells in an identical manner—by ionization. This term should be explained. As may be recalled in the discussion of the physical concepts of the atom (April, 1950, JOURNAL: 229-234), there is a nucleus of protons and neutrons about which electrons revolve in an orbit. This atom is electrically neutral. An atom is ionized when an electron normally revolving in an orbit about a nucleus is displaced. It is no longer neutral. When atoms are bound in compounds, *i.e.*, combinations of dissimilar atoms, electrons are shared. The electron has a negative electric charge while the remainder of the atom has a positive charge. These are referred to as ion pairs. When an atom, not free but bound within a molecule, is ionized, there is frequently a disruption of the molecule. The resultant rearrangement of molecules brings about a chemical change. The freed electron itself may have enough energy to produce one or more ionizations before it returns to a resting state and is captured. This is a mild sort of chain reaction. The free electron, when broken from an unbound atom, also may lead to a chemical change by an indirect route. Its energy level may be high enough to remove an atom from a molecule, creating a new molecular entity.

Another, less important, means of cell damage by which atoms are disturbed is by excitation. This is simply raising the atom to a state of higher energy which brings about a chemical change. This is less effective than ionization in large protein molecules and is often not considered in calculations. Ultraviolet rays are a favored means of producing pure energy level changes of this type, but roentgen and *gamma* rays can also do it.

The final manner in which cells may be damaged is by the degradation of radiant energy into heat. Heat is known to be important when short-wave radio waves are applied to cells, but the temperature rise from the radiant materials of nuclear energy probably can not account for the injury done. A dose of 100,000 roentgens (r) will only bring about a rise of about 0.25 C. This is too little to account for the damage done by such a large exposure. It has been postulated, though, that the temperature at the point of ionization is very high. The moderate rise of the entire mass is but an average of the total heat produced. Such a reaction no doubt does occur, but the effect upon the total population is a debatable point which is now being studied.

In another approach, cell damage has been classified as indirect and direct. Indirect effects are claimed by some to be caused by the activation of the extracellular fluids. It is thought that this is brought about by cell breakdown which has a deleterious effect upon intact cells. The importance of these two is a much argued question. Parabiotic experiments with cats by Lawrence, *et al.*[1] revealed no indirect effects. When 1 of the pair was irradiated,

no effect was seen in the parabiotic mate.*

Direct actions are believed to be the most important. Even here, controversy still exists as to how these take place. Probably the hypothesis favored by most followers is that of ionization. Others have proposed a simple target and hit principle. Most, but not all, of the evidence tends to support this localization of ionization or target principle.

From the foregoing, it may be inferred that with each increase in dosage of radiation, there should be an equal increase in the number damaged in each cell population. Conversely, the less the dose the less is the damage, until a hypothetical state is reached in which no radiation produces no damage. Evidence at hand more than warrants the acceptance of this conclusion. Such a situation is termed a linear relationship between dose and effect. For many years, there has been a popularly accepted theory of a "stimulating dose" of roentgen rays. This was no doubt due to artifacts.[2] It has no basis in critical experimental evidence. Actually, the whole theory of radiation therapy of cancer must be considered to be one in which the organism as a whole suffers less than the unwanted tissues, not stimulation.

There has been considerable discrepancy in experimental evidence and concepts as to the exact nature of cytologic alterations due to radiation. This has been due to variations in dosages, techniques, and interpretations of results. This situation should be corrected with further studies.

Damage to the cell membrane has been claimed by some and denied by others. This can be an important consideration. The cell membrane being a permeable barrier, an alteration in this property would undoubtedly result in abnormal exchanges of electrolytes, nutrients, and oxygen to the detriment of the cell.

The same is true with respect to the cytoplasmic inclusion or plasmagenes. Probably the first step in solving this will be to arrive at definite conclusions as to the functions of these bodies. The most that can be said at the present time is that they are in some cases more resistant to observable changes than the genes in the nuclei. The cytoplasm has been noted to swell following radiation in some cells. The genesis of this reaction is obscure.

The most obvious changes in cells are seen in the nuclei. Present concepts of the role of nuclei in the life of the cell attach great importance to its control of the physiology of the cell and also to its reproductive function. If this is so, then it should be expected that radiation damage of the nucleus will result in changes in the life of a cell and its reproductive capacities, including loss of both. Since these do occur, the evidence seems valid.

Just how important it is to give a description of the observable changes in the nucleus is a question, particularly in view of the fact that so little is known of the actual mechanism by which ill effects manifest themselves. With one exception, the above statement is true, the exception being the chromosomes altered by radiation. This has been intensively studied in the fruit fly in which, by fortuitous circumstances, the chromosomes of the salivary gland are enlarged many times and are easily studied. The changes which can be seen in the average nuclei are as follows: pyknosis, karyorrhexis, karyolysis, and vacuole formation. Sometimes, a focal margination of the chromatin can be seen leaving a fairly clear nucleoplasm. In other cells, the nuclei may be swollen and lobulated. An interesting paradox is that viruses, which are to a great extent composed of nucleoproteins, as are nuclei, and should be equally vulnerable, are quite resistant to x-rays. Red blood cells, which are all cytoplasm and without nuclei, are also resistant. But, cells which have both cytoplasm and nuclei are not resistant. Abnormal mitotic figures are a prominent finding among irradiated cell colonies. Especially seen are clumped chromosomes, multipolar mitosis, and lagging chromosomes. Typically, there is a pattern of mitotic cessation followed by a relatively amitotic period, depending upon the dosage given and cell sensitivity. This is followed by an increasing number of abnormal mitoses. How long such a state will last is difficult to know. There is some clinical evidence that it may continue for several years. In the case of germ cells, the defect may be transmitted to future generations if the cell or early fetus does not die.

*It is interesting to note that the irradiated mate is aided in his recovery by his nonirradiated twin through their common circulation.

RADIOSENSITIVITY OF CELLS

Cell species vary greatly in the threshold of radiation injury. Many hold that there is a correlation between the primitiveness of the cell type and its sensitivity to radiations. Another suggestion is that the effects of radiation are felt principally during mitotic division; therefore, cells which undergo rapid cycles of mitosis are the most radiosensitive. It is difficult to assess these ideas. The first mentioned probably has more adherents. It should be mentioned that exceptions to both suggestions are difficult to explain.

Desjardins[3] rates the radiosensitivity of various cell groups in the following order:

Lymphocytes.
Granulocytes.
Epithelial cells:
1) secretory gland basal cells;
2) testicular and ovarian follicular basal cells;
3) skin, mucous membrane, and gastrointestinal basal cells;
4) alveolar cells of the lung and bile ducts of liver;
5) kidney tubular cells.
Endothelial cells.
Connective tissue cells.
Muscle cells.
Bone cells.
Nerve cells (neurons).

Warren[4,5] adds the germ cells to the first order to sensitivity and places fibroblasts and their derivatives immediately after muscle cells. Bloom and Bloom[6] and Denstad[7] believe that erythroblasts are more sensitive than lymphocytes.

A peculiarity of radiation damage to cell populations or tissues is that it is not always immediately apparent. The lag may be as short as fifteen minutes with lymphocytes, up to several months or even years with neurons. A suggested reason for this is that the injury only manifests itself when cell division is attempted. Chromosome or gene alteration makes it impossible for the cell to divide. This is a mutation effect and it may account for later neoplastic growth in irradiated tissues.

Lymphocytes[3,4,8] and thymocytes[9] respond to small dosages of radiation by degenerating very quicky. Replacement is soon started and is complete in a few days or weeks. Moderate doses result in a slower repair process with atypical germinal centers. Large doses will leave a connective tissue matrix with only occasional lymphoid centers. The spleen[10] is somewhat similar to the lymph nodes and thymus but is less sensitive. This breakdown of lymphocytes results in a release of *gamma* globulin which, if it occurs in the presence of an acute infectious process, is thought to overwhelm the invading organism. This is used to explain the successful treatment of abscesses with roentgen rays. However, if total body irradiation is in sufficient quantity to slow down the regrowth of lymphocytes, there will be a period in which the animal is without protection. At this time, it may be overwhelmed by a septicemia.[11] The thymus seems to be the only cell group in which metabolism is not adversely affected by radiation reduction or destruction of the sulfhydryl-containing enzymes.[12]

One of the most interesting features in the lymphatic organs is the rapidity with which they atrophy. But the most interesting and mysterious of all is the proliferation of an atypical cell which resembles Maximow's hypertrophied lymphocyte. This is considered at some length by Liebow, Warren, and DeCoursey[13] and was also noticed earlier by De Bruyn.[14] Why these cells should be so resistant can not be explained.

EFFECT OF RADIATION ON VARIOUS TISSUES AND ORGANS

Bone.—Bone marrow studies by Bloom[15] indicated that hematopoietic cells were destroyed: first the erythroblasts, then the myelocytes, and last the megakaryocytes. Macrophages, reticular cells, and fat cells were resistant to injury. Dilated sinuses and a fatty, gelatinous marrow replaced the hematopoietic cells. Damage is roughly proportional to dosage, and if the dosage is not too high, regeneration takes place. A peculiarity was noticed with roentgen rays, in that marrow at the growing ends of bones was more sensitive than in the central portion. No explanation was satisfactory. Recovery of regenerative capacity of bone marrow is rapid, even after large doses.[7]

Bone marrow, according to Bloom,[15] is particularly vulnerable to ingested radioactive heavy elements such as radium, plutonium, and strontium which are de-

posited in and about the marrow. Oddly, roentgen rays have a similar injury pattern. Regeneration usually begins in the shaft and is followed by repair in the epiphysis and metaphysis. Following a long exposure to radiation, atypical fibrous bone develops and, occasionally, tumors form.

Bone is commonly thought to be insensitive to ionizing radiations.[13] It is true that it is relatively invulnerable. The degree of injury depends upon the dosage of radiation and age of the bone. Immature bone may have its growth halted or retarded if the exposures are repeated. Adult bone exposed to doses above a therapeutic level may show degenerating cells. If there is no intercurrent infection, a rare situation with whole body radiation, the devitalized bone will be bridged by a poorly formed, thin layer of bone laid down by periosteal activity.[16] This will also happen when a secondary infection occurs. There are similarities between external and internal radiation. As an example, osteogenic sarcomas may occur in both. An interesting finding by Heller[17] is that after a time, bone growth will resume in the presence of *alpha* and *beta* radiation when heavy radioactive elements are deposited in the bone, even though growth was temporarily halted.

Nervous System.—The central nervous system and nerves are also supposedly very resistant. In general this is true, but large doses will cause damage. According to Desjardins,[13] neurons are the most resistant cells, and damage to them is more often due to the action upon the sensitive endothelial cells of the nutrient vessels supplying the brain. In the Surgeon General's report,[18] only secondary hemorrhagic or necrotic changes are mentioned. No neurogenic tumors have been recorded in the literature.

Lungs.—The lungs, according to Englestad,[19] who worked with the rabbit, showed these changes with roentgen rays. There was an initial degeneration of lymph nodes, increased secretion from the bronchial mucous glands, congestion, and leucocytic infiltration. After two or three weeks, he noticed degeneration of the bronchial epithelium and supporting tissues, as well as a peribronchial and perivascular infiltration, and bronchopneumonia. Regeneration produced some sclerosis and connective tissue proliferation, osseous metaplasia, and proliferation of the bronchial epithelium. This whole process occurred in the midst of widespread degenerative changes. He did not notice any malignant alterations. Englestad also noticed a marked hyalinization which Rhoads[20] and Warren[21] had discussed previously. In addition, Warren mentioned early dilatation and engorgement of capillaries, and edema, and later a patchy, irregular atelectasis and emphysema of a marked or moderate degree. He also saw a pneumonitis and an adenoid epithelial proliferation. Bizarre gaint cells were found. Pleuritis is common, but its relation to radiation is disputed.

In mice, there is an increased incidence of lung tumors following long continued irradiation with *gamma* rays.[22] This undoubtedly will occur following all ionizing radiations.

Gastrointestinal Tract.—The gastrointestinal tract is classed as being very radiosensitive. However, the pancreas is quite resistant. There is little difference between internal and external irradiation effects upon the gastrointestinal tract as seen by Pierce.[23] The changes have been studied and reviewed at length by Friedman.[24] Severity of damage increases with increasing amount of radiation. This is quite constant throughout all animals studied, although there may be moderate difference in tolerance. The most noticeable changes occur in the epithelial cells but are not confined to them, as the supporting tissue cells also show alterations. The epithelial cells are swollen, vacuolated, and have prominent nucleoli and abnormal mitoses. Disintegration of nuclei and cytolysis may occur. The cells of the glandular epithelium are more frequently injured than those of the surface epithelium. Damage to the supporting stroma and to the blood vessels supplying the gut may be marked. Where lymph nodules are present, early damage can be observed. Edema may occur with moderate doses. With severe damage, there is often destruction of the epithelial lining, and ulceration. Hemorrhage, congestion, and leucocyte infiltration are noticed within a week, reaching a peak in about two months.

A rather striking increase in mucus secretion is an observation in sublethal doses. Higher doses cause the disappearance of the goblet cells. Atypical epithe-

lial cells frequently have been seen, and may be regenerative cells. Swelling and fraying of the vascular epithelium is often observed, probably giving rise to emboli and thrombi. Telangiectasis is not unusual.

The pancreas is radioresistant, and only by very heavy irradiation is damage produced.[24] This statement may hold true for the liver also, although heavy doses disturb the function of this organ. The bile duct and gall bladder act much like the intestinal tract except that comparatively large doses are needed to produce changes. The salivary glands are moderately sensitive with the mucin-secreting cells being damaged more easily than the serous type.

Vascular System.—The heart muscle is very radioresistant. Changes seen are nonspecific. Hyaline fibrosis, aseptic necrosis, and obliterative vascular changes such as are seen in any organ subjected to irradiation of moderately high dosage are all that can be found.[25] Petechial hemorrhages of the epicardium and edema are located perivascularly and rarely about the muscle fibers of the heart.[18]

Warren,[23] who has reviewed the extensive literature on radiation damage in the blood vessels, concludes that changes are mainly in the endothelium though no cells escape injury. Rhoades[26] was not able to produce this change, but she felt the dose given was inadequate. She noticed that collagen changes were most prominent and suggested that the endothelial alteration might be an optical illusion. The changes following irradiation resembled those seen in inflammatory processes, suggesting that there might be a relationship. Telangiectasis following radiation of the skin of man is a well-known response of small vessels to radiation.

Genito-Urinary System.—The radiation effects upon the genito-urinary tract are of particular importance, especially because of the gonads. The latter will be discussed from two different aspects—as endocrine glands and because of the genetic implications.

Heller[27] found that the interstitial cells of the testes were extremely resistant to irradiation and, except with neutron bombardment and internal radium exposure, the Sertoli cells were not altered. The spermatogonium was the most sensitive of the spermatogenic cells. She felt that reports to the contrary arose because the spermatogonial cells make an early attempt to regenerate while other cells are still being destroyed. Regeneration often took place even when all spermatogonial cells appeared to be absent. There is a question as to the origin of the regenerated spermatogonia. Deringer[28] considers radiation damage to the testes reversible, to a degree. Male mice, guinea pigs, or rabbits exposed to moderately heavy doses of roentgen rays were sterile for two months and were breeding normally thereafter. As will be mentioned during the discussion of the genetic effects of radiation,[29] this statement should not be accepted at its face value. Eschenbrenner and White,[30] studying the testes of mice, found a relative, but not absolute, increase in interstitial tissue. Heller noted, too, that the dosage is cumulative in effect, with very low daily doses of *gamma* rays producing aspermatogenesis. Bloom[31] also noted considerable variation in the effect of radiation injuries upon the ovary from *gamma* rays, roentgen rays, and internal radiation with various radioactive isotopes. This variation also occurred in different species of animals. However, the changes were quantitative and not qualitative. Doses of P^{32} (radioactive phosphorus) causes suggestive damage to the ovary of the mouse. In rabbits irradiated with roentgen rays over the whole body with a large single dose, no ovarian changes were seen for forty-eight hours. At this time, there was a marked clumping of the chromatin of most ova. By six days, no normal ova were seen and many were degenerating. Within ten to eleven days, a few apparently normal primitive ova and young, developing follicles were found. Degenerating follicles were still abundant. In the fourteen- and twenty-one-day specimens, a few additional follicles and a few follicles in the early stages were seen. The stroma was greatly condensed. In the 22-day specimens, there was a moderate increase in ova and follicles. In many, the nuclei of the ova were hyperchromatic. Paired ova were numerous. The stroma was dense. Mitotic figures were not seen. In another series with slightly less radiation, the primitive ova and developing follicles were not distinguishable from the normal ovary by forty-five days. Warren[32] comments on the difficulty of establishing a uniform steri-

lizing dose of radiation. Van Eck-Vermande,[33] who worked with mice, believes that the stroma of the ovary increases with destruction of the germinal tissue. He noticed no changes in the estrous cycle. Ickowicz[34] made an interesting observation. She noted that cellular pyknosis of the granular layer was inhibited in the granulosa layer of the rat ovaries when the animal was adrenalectomized prior to exposure. Deringer[28] considers radiation injury to the ovary cumulative and irreversible. He also noted the increase in ovarian tumors in chronically irradiated mice, particularly their early appearance.

With the exception of Bloom's[35] observation on the kidney of the baby chick, there are no reports of damage due to radiation to this organ. It is felt though that further study should be made with the internal administration of radioactive material normally eliminated by the kidney. It does not seem reasonable that damage does not occur to the renal epithelium. Desjardins[3] places the renal tissue low on his radiosensitivity list.

The urinary bladder may develop an inflammation following irradiation[25] but the damage is not permanent. Ulcers, which become heavily encrusted with urinary salts, may form. Microscopic changes are hyalinized connective tissue, thick-walled or dilated blood vessels, and fibrosis of the muscle layers.

EFFECT OF RADIATION ON SKIN

Radiation effects upon the skin have been more thoroughly studied. These changes were among the first seen by early radiologists. The most striking changes observed by Snider[36] were caused by *beta* irradiation which may have been due to the higher doses employed. The changes seen were not different from those observed by other workers using roentgen rays. Since these have been more extensively studied, the observations will be reviewed.

Grossly, after irradiation, an erythematous reaction appears within twenty-four to forty-eight hours. Then it fades. Ten to twenty-eight days later, it reappears. This in turn gradually disappears leaving a residual pigmentation.[37] The early effects are caused by direct cell injury, and the later effects by permanent changes in the vascular bed. Different, subsequent, clinical responses can be correlated with the degree of damage to the vessels. If the radiation is fairly heavy, edema may be noticed and an exudative dermatitis may ensue. Secondary infections are not uncommon. Loss of hair is also seen frequently.

Epilation of a temporary type will take place in man about three weeks after radiation with approximately 500 roentgens of x-rays. Permanent hair loss begins at 700 r.[37] Many workers have noticed that when an animal's hair has regrown, it will show "wild regions" and a preponderance of coarse hairs. The dose for permanent epilation in the dog is approximately 2,400 r and for the rabbit 2,000 r.[38] The hair follicles are quite sensitive, and the most superficial follicles are damaged to the greatest extent. Possibly an explanation for the return of coarse hairs is that they are derived from the deeper follicles.

Sweat and sebaceous glands are also sensitive. Within a few weeks, all that can be found are hyalinized remnants, or in the sebaceous gland, peripheral keratinization with a dry scaly skin.

The vascular endothelium shows swelling and necrosis, often with thrombi. If the endothelium is not destroyed, it may proliferate and close the lumen. Telangiectasis is sometimes a sequel some years later, or possibly ulceration may follow.

Carcinoma of the epidermoid type is the most common neoplastic occurrence in old roentgen ray burns of the skin with occasionally a basal cell carcinoma. Fibrosarcoma may develop.

SUMMARY

In summary, then, it can be said that the effects of ionizing radiation can be classified as follows:

1) Immediate cell death.
2) Delayed cell death (at or near mitotic division).
3) Genetic apparatus alteration (genes, chromosomes, or plasmagenes).
4) Physiologic or anatomic alteration.
5) Injury with recovery.

The effect upon a group of cells or an organ is an indirect effect which can be given as:

1) Toxic effect of dead or dying cells.
2) Neoplastic alteration which may be genetic (cancer).

3) Altered secretions as in the case of glandular cells.

4) Disturbed nutrition due to physical alteration of tissue.

5) Delayed growth resulting from temporarily injured cells.

These summaries are neither exhaustive nor complete, and are only given in order that there can be some feeling for the magnitude of the problems facing the investigator. Fortunately, such a tremendous job seems to stimulate the true scientist.

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Civil Defense and Nuclear Energy

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World War II saw the development of a strategy that called for the disruption of civilian centers of communication by bombing. It is probable that any future conflicts will see a continuation of this strategy and attendant destruction, chaos, and misery. Therefore, it is important that the public be informed so that they may intelligently participate in defense plans. Such plans will prepare, as far as possible, for all forms of wartime disaster, including bombardment with atomic and other missiles.

There are two possible applications of nuclear energy as a weapon. The first is through the release of the power of the nucleus of the atom, *i.e.*, the energy of the atom bomb about which most of us are in some degree familiar. Another method to be considered in defense planning includes the scattering of radioactive materials with the objective of making certain areas uninhabitable.

WHAT IS THE VETERINARIAN'S ROLE IN CIVIL DEFENSE?

Just what is the veterinarian's role in civil defense planning? It is likely that little effort, comparatively speaking, will be expended upon the animal population as such. If they are by chance involved, this then is an unexpected dividend for the striking agent. It is conceivable that animals in a stockyard, located as many are in important rail and industrial areas, might be within a bombed zone. The complete loss of such animals will not be so great a disturbance to our economy as the loss of the slaughterhouse, whose facilities must be reëstablished.

Perhaps a most fortunate single fact about nuclear energy as a war force is that it is not self-perpetuating as are the agents of biologic warfare. Although a heavily bombed city with its disrupted utilities might serve as a center from which contagious diseases would spread, it is not believed that such epidemics would be as devastating as those planned to take advantage of susceptible populations. There is good reason to believe that men or animals subjected to radiation will be more susceptible to intercurrent diseases than those who have not had such an experience. This speculation is derived from the fact that the lymphocytes, which are important to body defense, are so readily destroyed by small doses of radiation, and also from the observation of the susceptibility of irradiated small laboratory animals to upper respiratory infection. It is possible that organisms which are normally only saprophytic or even symbiotic will become pathogenic if barriers are disturbed by radiation. In such a situation, this might present a diagnostic problem to the veterinary clinician. It is even possible that diseases to which animal populations are usually refractive will become a problem.

Pet Animals and Animal Hospitals.—It does not seem important to try to save pet animals in the presence of an atomic disaster. It will probably be more important to reduce the stray animal population in order that rabies does not become rampant. What then can the operator of a small animal clinic contribute? Many of these clinics are located in the peripheral zones about cities. These are the areas least likely to expect great devastation. Since most of these hospitals are well supplied with dressings, antiseptics, surgical equipment, and other medical supplies, they might well serve as a first aid station. The veterinarian, because of his training, could contribute his services.

Bombed cities will probably be unable to cope with their own health problems, and neighboring communities will of necessity be called upon for aid. Incident to advanced planning for such assistance, it would seem logical to form disaster teams whose rosters would include physicians, nurses, physicists, sanitary engineers, and veterinarians. The general knowledge pertaining to sanitation and preventive medicine possessed by veterinarians would alone make them valuable members of such a group. Further, the services of the veterinarian could be utilized in connection with problems related to food inspection and the contamination of food by radioactivity. This is not meant to imply that the veterinarian should be a Geiger counter operator, although knowledge of this device would undoubtedly be of value to him, but rather suggests that his food inspection

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activities be coördinated with those monitoring personnel.

Farm Animals.—Farm animals are an unlikely target for weapons derived from nuclear energy. This is another fortunate circumstance. It means our nation's reservoir of food animals will probably be disturbed but slightly by this particular war instrument. Should there be a rain or "fall-out" of radioactive material, such as did occur at the first test of an atomic weapon, there might be some animals affected. The information gained by watching these animals for nearly six years is such that it can be said that no one would have been injured had they eaten the meat from them at any time during those years. If these fission products had fallen on the grass, there is a possibility that the animals might have consumed some radioactive material. However, intestinal absorption is so slight that negligible quantities of potentially dangerous material would have been taken up by the animal.

Hazards of Peace-Time Use of Nuclear Power.—One interesting possibility has not been considered. It is not related to warfare but to the peaceful uses of nuclear power. Industrial uses may lead to spread of radioactive particles to nearby pastures or waterways. Unlike an atomic blast, this will be a continuing function and it may be that there will be a build-up of radioactivity to such a point that there is a hazard to man and animals. This can be avoided by careful attention to operation safeguards. Veterinarians in these localities must always keep in mind such a possibility.

The veterinarian can play an important part in civil defense. How much will depend entirely upon the individual and what he has to offer. His skill, plus the intensity of his desire to serve his fellow man, will determine how well he will serve.

What You Should Know About Biologic Warfare

Here is down-to-earth talk about biologic warfare (BW): what it is, how it can be spread, what can be done to counter it, and what the responsibilities of each citizen will be in the event of an attack. This authoritative evaluation from the federal Civil Defense Administration contrasts sharply with the BW debacle previously envisioned by some writers who relied upon wild-eyed imagination rather than scientific fact.

Essence of the document is that BW holds definite dangers, but that it will neither kill millions nor cause uncontrollable epidemics. Clue to this nation's ability to cope with an attack lies in its health-safety system under guidance of "health officers, veterinarians, and plant specialists" instructed in BW defense. Proof that the system works is shown by its record in combating epidemics such as diphtheria and typhoid and imported animal plagues such as foot-and-mouth disease. And proof that it is keyed for wide-scale emergency operation was demonstrated by the prompt vaccination of more than 6 million New Yorkers exposed to smallpox in 1947.

The aërosol method of loosing germs and toxins is discussed and compared with "germ bombing" and other methods. Though never tried in actual warfare, aërosols could be used effectively. The crude attempt by the enemy to introduce glanders among horses scheduled for shipment to the allies during World War I is recalled and contrasted with more up-to-date possibilities of germ warfare on livestock, including dissemination of fowlpest and rinderpest. Tularemia and brucellosis are considered in the light of their ability to make people sick without killing them, the view being that an enemy might prefer to use these debilitating diseases in order to cripple our fighting and production forces and tie up physicians and hospitals.

This treatise explodes the myth that we could be attacked with some new germ or toxin that would bring quick illness or death to millions of people at once. Even the worst plagues do not spread like wildfire; an attacker would have a hard time getting disease agents distributed among large numbers of people, and no single type of disease germs will make everyone sick, it is explained. Moreover, any attempt to judge the potential damage should be guided by an understanding of the speed with which modern therapeutic agents will alleviate many kinds of illness.

A stumbling block in attempts to combat BW may be the unavoidable delay in arriving at a diagnosis, as a week or two of laboratory study might be required to determine a correct diagnosis. Blood-testing of exposed persons or animals would help speed identification, and to this end city dwellers and stockmen are urged to coöperate without hesitation when called upon for blood samples.

Completing the framework for BW defense are these additional instructions: Keep yourself, your home, and animal quarters clean; report sickness promptly

to a physician or veterinarian, as the case may be; don't rush outside immediately after a bombing; don't take chances with food or feed and water in open containers.

Like defense against air attack, defense against BW is neither sure nor simple, and "in spite of all our defenses we might be hit." There are many highly destructive plant and animal diseases for which there are as yet no practical controls, and spread of such diseases could create an extreme emergency. But with prompt action, adequate quarantine, and fullest coöperation of everyone concerned, losses can be greatly reduced.

Practicing veterinarians could perform a real service to their clients by keeping copies of this booklet on the magazine table at the office. Moreover, the small cost of an order in excess of 100 copies (7½ cents per copy) makes it economical to distribute to each regular client, as a public-spirited professional service.—[*What You Should Know About Biological Warfare. Federal Civil Defense Administration, Publication PA-2. U.S. Government Printing Office, Washington* 25, *Feb.* 1951. *Price* 10 *cents.*]

They're Spreading Disease

HOARD'S DAIRYMAN:—We have been trying to keep Bang's disease under control and out of our herd for many years. Sometimes I think that the folks who are supposed to be helping us are doing more harm than good.

Let's start at the very beginning—vaccination. We call the vet. He, and often a helper, shows up wearing shoes that have tramped through many barns, infected and otherwise. By just a little effort he, or they, can possibly bring a fairly good seeding of disease to my herd.

Later, should I have them back to blood test my herd, they can have a much better opportunity to seed the barn. They can really go to town. They can walk a pretty good path up and down the mangers, reading ear tags, drawing blood, and so forth. Probably, best of all, they can pass their nose twitch, carrying mucus from all cattle in the district back several years to all of ours, reactors and clean alike. Then they have a chance to help this out a little with their needle, which also is passed from cow to cow a long as it lasts, — with luck, perhaps years.

Now, don't say, "Feet, hands, twitch, needle, and so forth are disinfected." At least, I have never seen a drop of anything used except a few drops of water to wash out the needle between cows.

Suppose I want to sell an animal, whether she be a reactor or negative. A buyer comes with his infected truck, possibly with other reactors in it, but always with several inches of infected sawdust or other bedding in the bottom, a good deal of which is kicked in my barnyard in the process of loading. This should, and probably does, insure that I will get some reactors in due time.

I wish all folks coming to our farm were as careful and as considerate as the technicians doing our artificial breeding. They do a good job, disinfecting their boots and equipment, and taking reasonable, sound, sanitary precautions.

Pennsylvania. PAUL L. AMBER.

[Judging from letters addressed to the AVMA, the JOURNAL believes the above letter to the editor of *Hoard's Dairyman* (March 25, 1951) is of considerable interest to veterinarians. Therefore, we reprint it in full. Also for information on a related subject, we refer you to the article in the *Farm Journal* (April, 1951) entitled "It Could Hit Your Farm Tonight." This article discusses our "farms as a prime target in the event of biological warfare."—THE EDITORS.]

Wisconsin Emphasizes Disinfecting Boots

The following release, by the State of Wisconsin Department of Agriculture, addressed to Wisconsin veterinarians was received in the AVMA office. Because of its timely connection with the article reprinted from *Hoard's Dairyman* (above), we print it as a follow-up to that article.—THE EDITORS.

March 29, 1951

To All Accredited and Approved Veterinarians:
Dear Doctor:

Complaints have reached this office concerning veterinarians failing to clean and disinfect their boots and other equipment following brucellosis and tuberculosis testing of herds. Charges of this sort are detrimental to all veterinarians and a few complaints have reached both the legislature and the Governor's office.

As you well know, the average livestock owner is well aware of the necessity of cleaning and disinfecting and is severely critical of a veterinarian who does not do this. It is required that you clean and disinfect your boots and equipment for all project work you do for the state. To avoid unjust criticism from the livestock owner it would be well to follow this practice at all times in your private work. We know that most veterinarians are very careful in cleaning and disinfecting their boots and equipment,

but the failure of one person to do this can create criticism upon the entire profession.

Very truly yours,

DIVISION OF LIVESTOCK SANITATION

H. J. O'Connell, Chief.

"Proceedings Book" Called Worth-While Service to Members

The editorial staff of the AVMA appreciates the fine response to the 1950 "Proceedings Book" evidenced in letters from AVMA members. Following are excerpts from a few of the letters:

This ("Proceedings Book") is indeed a fine piece of work and I sincerely hope that it may be continued each year. . . . Congratulations on the "Proceedings Book". Keep up the good work. . . . You have done an excellent job on this publication and I hope the publishing of convention papers will be continued in this way. . . . I have just received my copy of the proceedings of the last AVMA meeting and congratulate you and your associates on a splendid job. . . . The "Proceedings Book" is a splendid idea and continuance of it in future years has my vote—it is a fine job. . . . I am very pleased with this publication and hope that the AVMA may continue to publish the proceedings of its annual meetings in this manner. . . . When I first saw it ("Proceedings Book") I thought it was grand. After reading it and realizing all the pertinent information contained in it, and ready for easy reference, I realized it was even better. . . . The "Proceedings Book" reached me in good shape and how happy and delighted I am to have it. I can now relax in my arm chair and really feel my presence at the meeting. . . . I have heard many favorable comments on the "Proceedings Book." I personally think it swell. . . . The "Proceedings Book" is a nice service for members. . . . The "Proceedings Book" in my opinion is an excellent improvement over the publication of these papers in the JOURNAL.

Veterinarians Speak to Feed Manufacturers

Dr. George H. Hart, dean of the School of Veterinary Medicine at the University of California, and Dr. James A. Baker, director of the Veterinary Research Institute at Cornell University, were speakers at the forty-third annual convention of the American Feed Manufacturer's Association in Chicago, May 10-11, 1951.

Dr. Hart's subject was "Nutrition in Relation to Disease" and Dr. Baker spoke on "Conservation of Animals by Disease Control." The appearance of these eminently qualified veterinarians on the A.F.M.A. program indicates recognition by the feed industry of the importance of animal diseases. It also indicates the excellent relationship which exists between the feed manufacturers and the veterinary profession.

Study of Fertility.—At a meeting of the American Society for the Study of Sterility in Atlantic City, June 9-10, 1951, a paper entitled "Basic Sciences and Veterinary Problems Relating to Infertility" was presented by Carl G. Hartman, Ph.D. Four other papers on sterility in man were given by M. D.'s.

Standard Nomenclature Needed

The need for standard nomenclature of diseases is nowhere more evident than in avian pneumoencephalitis. This respiratory-nervous disorder is variously called Ranikhet disease (a place in India where it was reported), Newcastle disease (England), Asiatic Newcastle disease, Doyle's disease, fowlpest, pseudo-fowl plague, Korean disease, and no doubt others we have not yet heard about.

Milwaukee City Hall. Milwaukee is the site of the AVMA annual meeting, August 20-23, 1951.

The Effect of Vibriosis on Breeding Efficiency in Cattle

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DURING 1918 to 1923, Theobald Smith *et al.* [1-6] named and established *Vibrio fetus* as a cause of abortion in cattle. However, McFadyean and Stockman,[7] in 1913, were apparently the first to report the finding of Vibrio-shaped organisms in fetuses aborted by cows in Ireland and Wales. A recent review of the literature by Roberts *et al.*[8] shows that vibrionic abortion occurs in most sections of the United States and in Canada, Australia, Europe, and South Africa.

Evidence that *V. fetus* may further impair breeding efficiency by interfering with conception has been reported by Plastridge *et al.*[9] and more recently by Stegenga and Terpstra,[10] and Haubrich[11] who, in commenting on herds in which *V. fetus* infection had been diagnosed, said "In some herds a minor delay in conception of two to four months is noted while in others nearly an entire herd has remained open for six months to one year." The organism is also one of the causes of retained afterbirth, as shown by Smith[3,5] and Moore.[12, 13]

In consideration of the several clinical manifestations of *V. fetus* infection and the probable existence of infection (as indicated by the agglutination test) in some animals in the absence of clinical evidence, the term "vibriosis" is proposed to indicate *V. fetus* infection.

Improved methods for growing *V. fetus* developed by Plastridge *et al.* [14,15] and Huddleson[16] have made possible wider use of the agglutination test as an aid in diagnosis of vibriosis. With the aid of interested veterinarians, it has been possible to test herds periodically and observe the effect of vibriosis in several herds. Data obtained on the course of *V. fetus* infection in a representative herd, the effect of vibriosis on breeding efficiency in several herds, and a discussion of the disease and possible aids in control are presented.

EXPERIMENTAL

Breeding Records.—The following information was obtained on each animal in herds under observation: age, date bred, number of services required, date of normal or abnormal parturition, and reason for disposal if removed from the herd.

Diagnostic Tests Used.—Aborted fetuses, and accompanying amnionic fluid when obtainable, were examined by microscopic and cultural methods described previously.[17] Blood samples were collected at intervals of three to six months from all animals over 2 years of age, and at times from those between 6 months and 2 years of age. These were examined by the tube agglutination method, as described previously.[17,18] Until 1948, antigen was prepared from cells of strain MI grown in soft agar consisting of liver infusion, 1.0 per cent bactopeptone and 0.3 per cent agar. "Thiol medium" (Difco) was substituted for the original soft agar in 1948. Owing to the increase in sensitivity of antigen prepared from strain MI, the titer regarded as positive was increased from 1:200 to 1:400 in 1946.

Starting in 1949, strain UM was substituted for strain MI and antigen prepared from cells grown on a solid medium[19] consisting of 19 Gm. of agar, 0.05 Gm. glutathione, and 1 liter of thiol medium. The stock culture was maintained in liquid thiol medium. Seed cultures were originally made on the solid medium, but more recently cells from liquid thiol medium cultures have been used to inoculate agar for antigen production. The first

Presented in part at the annual meeting of the New England Veterinary Medical Association, New London, Conn., Oct. 10-11, 1950.

Supported in part by funds provided for Regional Research by the Research and Marketing Act of 1946 and the Ralph E. Ogden Foundation, Inc.

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The writers express their appreciation to Drs. Jean Smith, state veterinarian (Conn.); E. R. Dimock, Merrow, Conn.; D. W. Gill, Brooklyn, Conn.; Merrill Goodman, Washingtonville, N. Y.; W. H. Haubrich, Claremont, N. H.; V. J. Peppe, Canaan, Conn.; and N. W. Pieper, Middletown, Conn., for assistance in obtaining blood samples, fetuses, and breeding records, and administering some of the experimental treatments mentioned in this report.

antigens made from strain UM in 1949 gave no agglutination with "negative" serums diluted 1:25, and titers of 1:50 were classed as positive. However, on continued cultivation, strain UM gradually changed, as did MI, until antigens prepared one year later gave "normal" titers up to 1:100, and titers of 1:400 were interpreted as positive. In order to evaluate reactions given by each antigen, it was necessary to test the antigen against a known positive serum and a minimum of 50 bovine blood samples selected at random from those sent in for routine brucellosis testing. The normal titer was taken as the highest serum dilution in which approximately 85 to 95 per cent of the samples gave incomplete or complete agglutination, and the positive titer as four times the normal titer.

RESULTS

Course of Infection in Herd D.—This herd was free from brucellosis and consisted of an average of 30 adult purebred Holstein-Friesian animals. During the last six months of 1944, 3 cows, including 1 recently purchased, aborted. All 3 were positive to the agglutination test for vibriosis on the first herd test which was made in March, 1945. It appears that the purchased animal, which was sold after she aborted, was the probable source of infection. Blood samples were drawn at intervals of three to six months from March 26, 1945, through Sept. 29, 1950, and tested against both *Brucella abortus* and *V. fetus* antigens. None of the samples reacted positively to the agglutination test for brucellosis. The results of the agglutination test for vibriosis (animals over 2 years of age), the number of positive reactors that aborted or were sold because of sterility, indicate the course of infection in herd D, and are summarized in table 1.

TABLE 1—Summary of Observations on Herd D

Animals		1945	1946	1947	1948	1949	Total
Total Number		27	28	30	31	29	61*
Positive	Number	15	6	7	3	2	37
	Aborted	4	1	0	0	0	5
	Sold (sterility)	2	1	1	1	1	6
	Sold (total No.)	6	2	5	1	1	15
	Changed to negative	8	3	7	2	1	21
Per cent positive		56	21	25	10	7	—

*Animals in herd one year or more during five-year period.

During 1945, 15 (56%) of 27 animals reacted positively to the agglutination test for vibriosis; 4 of these aborted and 2, including 1 of the aborted cows, were sold because of failure to conceive. Eight of the 15 became negative and 6 were sold. The following year (1946), the incidence of positive reactors decreased to 21 per cent, 1 of 6 positive cows aborted, and 1 was sold because of sterility. The incidence of positive reactors was 23 per cent in 1947, none aborted, and 1 of the 7 positive cows was sold because of failure to conceive. During the following two years (1948 and 1949), the incidence of positive reactors was 10 and 7 per cent, respectively. No abortions occurred and 1 positive-reacting heifer was sold each year because of sterility.

Both the incidence of positive reactors and clinical evidence of vibriosis (abortion and animals sold because of sterility) decreased the first year following the initial outbreak of infection. As indicated in the last column of table 1, the decrease in incidence of positive reactors was due to the recovery of 21 animals and the sale of 15 positive reactors. During the last two years of observation, the incidence of positive reactors was low and, with one exception, limited to heifers.

TABLE 2—Relation of Age to Reactors in Herd D

Age (years)	1945	1946	1947	1948	1949
½ to 1	n.t.	n.t.	0/8	0/6	0/7
1 to 2	n.t.	n.t.	3/8	2/9	1/7
2 to 3	2/4*	2/6	0/1	2/4	2/6
3 to 4	4/7	3/8	6/9	0/2	0/2
4 to 5	4/7	0/5	0/6	0/8	0/1
5 +	5/9	1/9	1/11	1/11	0/17
Total	15/27	6/28	10/43	5/40	3/40

*Positive animals/total animals; n.t. = no test.

During the five-year period of observation, 5 reactors aborted and 6 positive animals were sold because of failure to conceive. This suggests that the latter condition may be as important, if not more so, than actual abortion in herds affected with vibriosis.

Relation of Age to Positive Reactions in Herd D.—The distribution of positive reactors in different age groups in herd D is given in table 2.

During the first year of the outbreak, about one half of the animals in each age group reacted positively. This suggests that animals over 2 years of age, not previously exposed to infection, are of equal susceptibility to infection.

The following year (1946), a significant

change in distribution of positive reactors occurred; of 14 cows over 4 years of age, 1 reacted and aborted, 6 of the 14 were positive on one or more tests made during the previous year, 3 of the 8 heifers in the 3-to-4-year-old group, and 2 of the 6 heifers 2 to 3 years of age, reacted positively.

TABLE 3—Relation of Services Required to Time Animals Reacted Positively—Herd D

Time of positive reaction	Animals (No.)	No. of services total	No. of services ave.
Before animals became positive	17	41	2.4
At time animals reacted positive	13 (3)*	51	4.0
After animals became negative	41 (1)*	87	2.1

*Animals sold before conception.

In 1947, only 1 of the 17 animals over 4 years of age reacted positively; while 6 of the 9 heifers 3 to 4 years of age were positive, and the heifer 2 to 3 years of age was negative. Three of the 8 heifers 1 to 2 years of age reacted positively and none of those 6 months to 1 year of age reacted.

The trend toward occurrence of positive reactors in the 1-to-3-year-old-group, only, continued during 1948 and 1949.

In general, the results obtained indicate that (1) distribution of positive reactors in all age groups coincides with the period of greatest clinical evidence of vibriosis and also indicates recent exposure of the herd to infection; (2) that after the disease has been present in a herd for one to three years, a low incidence of infection may persist in heifers 1 to 3 years of age; and (3) that heifers under 1 year of age tend to be naturally resistant to infection.

Relation of Positive Reactions to Conception in Herd D.—The fact that several positive reactors were sold because of failure to conceive, indicated that vibriosis interfered with conception. The records on herd D were analyzed to determine the number of services required for conception by cows and heifers bred before, at the time of, and after they reacted positively. The results are given in table 3.

Seventeen animals, bred from three to twelve months before they reacted, required an average of 2.4 services for conception; 13 bred at the time they were positive (3 sold before conceiving, not included) required an average of 4.0 services; and 41 animals bred from six to twenty-four months after they had changed from positive to negative required an average of 2.1 services. One of the 41 was sold before she conceived.

It is of interest that 6 of the 13 animals bred at the time they reacted positively were heifers under 2 years of age. Two were sold before they conceived, after 4.0 and 5.0 services, respectively—1 in 1947 and 1 in 1949. At this time, as indicated in table 2, positive reactors were largely limited to heifers. Three of the 4 remaining heifers required 4.0 services and 1 required 3.0.

The average number of services required by 24 animals that were negative at all times tested was 2.3. This figure is increased by several animals that required from 4.0 to 6.0 services and that were bred between tests made at six-month intervals. It is possible that some of these animals might have shown a positive reaction if tests had been made at more frequent intervals. None of the negative group were sold because of sterility.

In general, these findings indicate that vibriosis may impair the breeding efficiency of a herd as much by interfering with conception, or causing very early abortion, as by causing abortion at later stages of pregnancy when abortion can be detected.

Effect of Vibriosis on Conception in Five Herds.—Records collected on five additional *V. fetus*-infected herds that were tested periodically during the last two years were examined to obtain further information on the conception rate of animals positive to the blood test. The results are summarized in table 4.

TABLE 4—Relation of Time of Positive Reaction to Conception (Five Herds)

Open	At time bred	1 to 3 months after conception	Animals (No.)	Ave. number of services
P	N	N	21	1.2
P or N	P	P or N	70*	3.2
N	N	P	43	1.7

*Twelve additional animals were sold as nonbreeders.
P = Positive; N = negative.

Twenty-one cows and heifers that reacted positively when open, and became negative by the time they were bred, required an average of 1.2 services (range, 1 to 3); 70 that were positive at the time bred required an average of 3.2 services (range, 1 to 6 services); and 43 that were negative at the time bred, and positive on

the next test, made from one to three months later, required an average of 1.7 services (range, 1 to 5.). Twelve animals that were positive at the time of service were sold as "nonbreeders" after 4.0 to 12.0 services.

These findings are further evidence that vibriosis either interferes with conception or causes discharge of the fertilized ovum soon after conception, since the number of services required to produce pregnancy of more than three months' duration was significantly lower for animals that reacted positively at the time of service than for animals that were negative at the time they were bred.

TABLE 5—Relation of Time of Positive Reaction to Abortion (Five Herds)

Months after conception			Animals	Aborted	
1-3	3-6	6-9	(No.)	(No.)	(%)
P	N	N	33	1	3
	P	N	5	1	20
	P	P	5	4	80
N	P	N	21	5	24
	P	P	14	8	57
	N	P	10	2	20
Total			88	21	24

P = positive; N = negative.

Incrimination of *V. fetus* as a cause of sterility is further supported by the isolation of the organism from the uterus of both of 2 cows that were slaughtered because they had failed to conceive after 10.0 services. Each uterus had a mild metritis accompanied by a small amount of yellowish exudate adhering to the mucosa. Both cows were serologically negative on tests made four months before slaughter, although several other animals in the herd reacted positively at the time. This suggests that uterine infection may occur in some animals and interfere with conception in the absence of a significant blood serum titer.

Relation of Time of Positive Reaction to Abortion in Five Herds.—Data collected on the five herds used in observing the effect of vibriosis on conception rates were further examined to determine the relation of positive reactions during different stages of gestation to abortion. The results are given in table 5.

During the first three months of pregnancy, 43 cows and heifers reacted positively. Of these, 33 became negative by the third month of pregnancy and 1 (3%) aborted. Of the 5 animals that retained a positive reaction from three to six months and then became negative, 1 (20%) aborted. In comparison, 4 of the 5 animals (80%) that were positive at the time of conception and retained a positive reaction beyond the sixth month of pregnancy aborted.

After the first three months of pregnancy, 45 animals became positive. Five of the 21 animals (24%) that were negative, positive, and then negative during the three periods of observation aborted. The abortion rate was 57 per cent in the group of 14 animals that became positive after the third month of pregnancy and remained positive for a period of three to six months. Of the 10 animals that remained negative beyond the sixth month of pregnancy and then became positive, 2 (20%) aborted.

The abortion rate was highest among pregnant animals that reacted positively between the third and sixth month of pregnancy, and retained a positive reaction beyond the sixth month of pregnancy. In general, it appears that a single positive reaction indicates a light infection and a persistent positive reaction (longer than three months) a more severe infection.

Vibrio Fetus Bacterin.—During 1946 and 1947, approximately two thirds of the negative cows and heifers of breeding age in three herds were treated with bacterin. Animals in the treated group were given three subcutaneous injections of 5 ml. each of a formalin-killed suspension of *V. fetus* cells (density corresponding to a McFarland nephelometer reading of 5). The interval between injections was five days. A summary of the breeding records of the control and treated groups is given in table 6.

TABLE 6—Results Obtained with Vibrio Fetus Bacterin

Animals	Bacterin-treated	Control
Number	63	47
Aborted	4	3
Sold because of sterility	2	4
Average number of services	2.5	2.3

The results indicate that the bacterin was of no value in controlling vibriosis. No significant differences were observed in the abortion rate, number of animals sold because of sterility, and conception rates between the treated and control groups.

Chemotherapy.—Haubrich[11] reported

that intrauterine infusions of streptomycin have shown encouraging results in overcoming infertility in aborted cows and heifers. Easterbrooks and Plastridge[19] reported that intrauterine infusions with 1 Gm. of streptomycin in 15 to 20 ml. of vehicle (water or a commercial water-in-oil emulsion) appeared to be effective in overcoming sterility associated with vibriosis in two herds. These data and those obtained in two additional *V. fetus*-infected herds are combined in table 7.

TABLE 7—Effect of Intrauterine Infusions of Streptomycin on Vibrionic Sterility

Groups	No. of animals in group	Conceived 1st service after treatment began	Average number of services	Failed to conceive
Control	9	2	3.2	3
Treated during heat	11	9	1.6	1
Treated between heat periods	7	6	1.4	0

All animals in the experiment had been bred three or more times without conceiving. In two herds, part of the nonbreeders were not treated (controls). Animals in both the control and treated groups were bred as they came in heat after the start of the experiment.

Of the 9 animals in the control group, 2 conceived on the first service, and a total of 6 conceived with 3 remaining open after an average of 3.2 services.

Eleven animals were treated at the time of heat and bred on the following heat. Nine of the 11 conceived on the first service after treatment and 10 conceived with 1 remaining open after an average of 1.6 services.

An additional 7 animals were treated between heat periods and served on the heat immediately following treatment. Six conceived on the first heat after treatment, and the entire 7 animals required an average of 1.4 services.

The results obtained confirm those previously reported by indicating that intrauterine infusions with streptomycin are of value in combating apparent sterility associated with vibriosis.

DISCUSSION

Abortion and breeding trouble are symptoms of one of several diseases. While brucellosis remains the most important single cause of these symptoms in the cattle population as a whole, the relative importance of other causes, especially vibriosis, tends to increase as the incidence of brucellosis decreases. In brucellosis-free herds, *V. fetus* has caused an annual abortion rate of 4 to 20 per cent, the sale of cows because of sterility, and a reduced conception rate. These three clinical manifestations of vibriosis have caused serious losses in a number of herds by causing the sale of cows for slaughter, reducing the calf crop, and lowering milk production.

Vibriosis is not limited to brucellosis-free herds. In some herds, both brucellosis and vibriosis have been active at the same time. While calf-vaccinated cows sometimes abort from brucellosis, vibrionic abortion has been observed in calf-vaccinated, untested herds in which abortions were erroneously attributed to failure of the vaccine to protect against brucellosis. A serious outbreak of vibriosis has been observed in a large herd in which the majority of the adult cows were vaccinated with strain 19 *Brucella abortus* vaccine the previous year. In this herd, abortions from both vibriosis and brucellosis occurred among the cows that reacted to the blood test for Brucella infection, while abortions among those negative to this test were due to *V. fetus* infection.

In several *V. fetus*-infected herds, both the incidence of infection (as indicated by the agglutination test for vibriosis) and losses from the disease have been greatest during the first twelve months following the apparent introduction of infection. During this time, all sexually mature females appeared to be equally susceptible. Observable abortions occurred most commonly among those pregnant from three to six months, and many of those that reacted at the time of service required 3 or more services for conception and a few failed to conceive on repeated services. However, twelve to eighteen months after the initial outbreaks, both the incidence of reactors to the blood test and animals showing clinical manifestations decreased markedly as the result of the recovery of the majority of the affected animals and the sale of some positive reactors that aborted or failed to conceive. Thereafter, the abortion rate was low and the reproductive efficiency of the herd, as a whole, was good. However, in-

fection tended to persist in the heifers, as indicated by periodic tests, causing an occasional abortion, the sale of some of these animals because of sterility, and a lowered conception rate in others. The diagnosis of vibrionic abortion at this stage of infection would lead one to believe that vibrionic abortion is sporadic and of little economic importance, as reported by Brocklehurst.[20] It is also likely that, in some herds, infection may be limited to 1 or 2 cows that abort (usually sold) without spreading the infection. However, data collected on a number of known *V. fetus*-infected herds show that an outbreak of vibriosis can, for a period of six to eighteen months following the start of infection, cause as serious losses as those resulting from an outbreak of brucellosis.

From the data presented herein on herd D, and from records on several other herds in which we believe infection was detected soon after its introduction, it appears that the distribution of positive reactors among all age groups indicates recent infection; and that a low incidence of reactors for a herd, limited primarily to animals 1 to 3 years of age, indicates that infection has been present in the herd for a year or more.

The length of time infection will remain in a herd, whether it will disappear entirely, and whether another cycle of rapid spread will occur several years after the initial outbreak remain to be determined. To date, several of our 25 experimental herds have been under observation for three to five years and some evidence of infection has continued to remain in these herds, although, for practical purposes, vibriosis is no longer a serious problem.

The source of infection in several herds has apparently been purchased cows, and in other herds the source of infection is not known. The possibility of herd sires introducing and spreading infection was suggested by Plastridge *et al.*[9] who found that bulls in several infected herds reacted to the agglutination test for vibriosis. Recently, Stegenga and Terpstra[10] reported the isolation of *V. fetus* from the semen of a bull suspected of spreading infection. The possibility that infection may be carried from one farm to another must be considered, since Lindenstruth and Ward[21] found that *V. fetus* cells can remain viable for periods up to ten days in suspensions of hay, soil, and manure.

The spread of infection in a herd appears to occur by direct contact with infected animals or indirectly by contact with material discharged from the genital tract of an infected animal. So far as known, *V. fetus* organisms occur in the genital tract only of infected animals. Since unbred heifers sometimes give high agglutinin titers, spread is not restricted to sexual intercourse. However, recent experiments by Plastridge and Easterbrooks[22] show that infection can be induced by inseminating heifers with artificially infected semen.

Control measures that may be suggested on the basis of our present knowledge of vibriosis are:

1) Use laboratory tests (bacteriologic and serologic) to aid in the diagnosis of vibriosis in herds in which breeding records suggest the presence of the disease.

2) Blood test cows or bulls for addition to the herd at the time of purchase, and again four weeks later, keeping the animals in isolation during this period.

3) In infected herds, breed artificially, using diluted semen containing 500 micrograms of streptomycin per milliliter.[23]

4) Examine periodically (by a veterinarian) for pregnancy and sterility within the herd.

5) Treat heifers and cows that fail to conceive after 2.0 services with an intrauterine infusion of 1 Gm. of streptomycin in 15 ml. of water or commercial water-in-oil emulsion.

SUMMARY

Observations on the course of *Vibrio fetus* infection (vibriosis) in a representative herd, and effect of the disease on breeding efficiency in several herds, may be summarized as follows:

1) Animals over 2 years of age, not previously exposed to infection, appeared to be of equal susceptibility to infection.

2) During the first year following the appearance of infection in a representative herd, the incidence of positive reactors and clinical evidence of vibriosis appeared to be greatest and equally distributed in different age groups. After the disease had been present in the herd for one to three years, a low incidence of infection tended to persist in heifers 1 to 3 years of age.

3) Results are presented that indicate that vibriosis may impair the breeding effi-

ciency of a herd by lowering the conception rate and causing the sale of cows because of sterility, as well as by causing abortion.

Observations on the stage in the breeding cycle in which positive agglutination reactions occurred indicated that cows or heifers bred when positive required a greater number of services than those bred when negative; and that the abortion rate was higher among cows that developed a positive reaction during the first six months of gestation which persisted three months or longer, than among cows that reacted during the first three months or last three months, only, of gestation.

The use of *V. fetus* bacterin on negative cows and heifers was of no value in preventing the spread of vibriosis.

Control measures suggested are: laboratory tests to aid in diagnosis, blood testing of cows or bulls added to the herd, artificial breeding with streptomycin-treated semen, periodic pregnancy and sterility examinations by a veterinarian, and treatment of nonbreeders with intrauterine infusions of streptomycin.

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Time of Ovulation in Dairy Heifers

Cattle ovulate spontaneously but differ from most other species in that ovulation does not occur regularly until postestrus. There has been considerable speculation as to the effect of copulation on the time of ovulation in dairy cattle, especially since the extensive adoption of artificial breeding and possible lack of sexual stimulation by this process of breeding.

This study was undertaken to determine the effect of sterile copulation on the time of ovulation in the cow and on other phenomena related to estrus. A vasectomized bull and 30 pure-bred dairy heifers were used.

The heifers ovulated, on the average, at 7.7 hours following the end of estrus when serviced by a vasectomized bull, as compared to 9.9 hours when not serviced. The difference was highly significant. Sterile copulation had no effect on the length of estrous periods or subsequent estrous cycles.—*J. Dai. Sci., Dec., 1950.*

Diaphragmatic Hernia in the Cow

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Reported cases of diaphragmatic hernia in the cow are conspicuous by their absence. The only reference found in the available literature is by Hutyra, Marek, and Manninger.[1] This authority states that "the hernia usually concerns the reticulum, more rarely the omasum. In this condition, symptoms of disturbance of health are rarely absent. In most cases there is difficulty in breathing, especially when lying down and after feeding. . . .In ruminants, there are signs of gastric distension or atony, or pseudo-pericarditis caused by pressure on the heart."

Fig. 1—Showing the upper closed part of the rent with the capsule of the spleen sutured to one border of the rupture.

The following case is reported because of the apparent rarity of the condition in the bovine subject.

For two months, a 10-month-old Hereford heifer had suffered from irregular but frequent attacks of bloat. The appetite was capricious; elimination was normal, and grinding of the teeth was constant and conspicuous. The owner believed that the animal had "eaten something that won't digest" and, in view of the gradual loss of condition, sought veterinary advice. At the time of examination, the temperature was 103 F. Linseed oil was prescribed. The heifer showed no improvement by the end of a week and the case was referred to this hospital by the veterinarian in attendance. The animal was examined on arrival and the following points noted: temperature, 104.6 F.; respiration, 92. The stature suggested that the age was nearer 6 months than the stated 10 months. The general condition was fair. There was a mucopurulent discharge from the eyes and nose. On moving the heifer around the pen, a slight cough was evident. Percussion of the left flank revealed a slightly tympanitic rumen. Auscultation of the left side of the thorax revealed no pulmonary sounds but a quiet splashing sound was noted over the cardiac region. Percussion gave a very resonant response over the whole area of the left lung. The right lung showed increased vesicular murmurs with areas of consolidation.

The diagnosis was pneumonia of the right lung and, tentatively, indigestion of unknown origin.

The prognosis was unfavorable.

It was decided to perform an exploratory laparotomy in an attempt to discern the cause of the alimentary symptoms. The upper left flank was prepared as for rumenotomy and anesthetized by means of an inverted "L" block using procaine (2%).

The rumen was exposed and incised and a search was made for any foreign body that might be present. It was noted that the passage of the hand in an anterior direction did not result in entry into the reticulum, for this organ was diverted sharply to the right of the mid-line. No

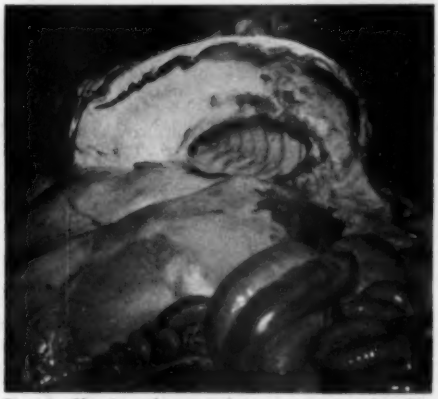

Fig. 2—Showing the complete rupture in the diaphragm after removal of the sutures closing the dorsal half of the rent.

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foreign body was located in the reticulum or the rumen. The rumen was found to extend as far forward as the caudal angle of the scapula. The rumen was closed by Lembert sutures and attention was then directed to the diaphragm. By exerting pressure on the rumen toward the mid-line, a clear and uninterrupted view of the interior of the left side of the thorax was obtained through a rent in the left part of the diaphragm. The opening was some 12 in. long and extended mainly in a dorso-ventral direction. The left lung was atrophied and atelectatic. The pericardium revealed no abnormality on palpation. A small quantity of frothy, white material was present on the floor of the anterior part of the thoracic cavity. No respiratory distress was evident during the entire operation. No blood-stained fluid was seen in either the thorax or abdomen.

Fig. 3—Showing the atelectatic nature of the left lung (after opening of the chest on autopsy).

Since the edges of the diaphragmatic lesion were thickened, smooth, and could not be approximated, an attempt was made to use the spleen as a means of "filling the gap" by suturing the capsule of the latter organ to the edges of the hernia. The dorsal half of the rupture was successfully closed but approximation of the ventral 6 in. proved impossible. The rumen was allowed to fall back into its normal position in the abdomen, before the closure of the laparotomy incision.

The following day, the animal appeared brighter and breathing seemed easier, but in the afternoon, the rumen became rapidly tympanitic and the condition was relieved by passage of the stomach tube. This manipulation had to be repeated on the two succeeding days.

On being informed of the heifer's condition and its poor prospects for a healthy future, the owner readily consented to euthanasia. This was carried out on the third day after the operation.

In addition to the features already mentioned, autopsy revealed a small tract between the ventral surface of the abomasum and the adjacent part of the parietal peritoneum. A portion of extruded ingesta had been effectively walled off from the remainder of the peritoneal cavity.

Three weeks after the occurrence of the above case, my colleague, Dr. R. F. Bourne, in the course of routine meat inspection, observed a case in a heifer of mixed breed. No previous history of disease was available, but the condition appeared to be of long standing because a false "lobe" had been formed on the herniated part of the liver as a result of pressure by the edges of the torn diaphragm. The etiology of both the above cases remains unknown and

the writer agrees with Kent[2] when he says, "The recognition of a congenital, as contrasted with an acquired, condition is not always simple." Gruber, quoted by Kent, maintains that "prolapse of numerous organs through a much restricted opening indicates a probable congenital condition, especially in horses and cattle." Judging by this statement, it appears probable that Dr. Bourne's case was of congenital origin.

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Measuring Spermatozoa Numbers

The increased use of artificial insemination of dairy cattle has resulted in semen being diluted at higher and higher levels. It has been demonstrated that spermatozoa numbers can be reduced only to certain limits without reducing breeding efficiency. When diluting semen at higher levels in the field, it is therefore necessary to have some means of determining spermatozoa numbers in semen quickly and accurately.

This author reports that the photelometer will give more reproducible readings for any given semen sample than will the hemacytometer.—*J. Anim. Sci., Feb., 1951.*

Possible Causes of Physiologic Sterility in Cattle

In cows with apparently normal reproductive organs, some 30 to 35 per cent regularly failed to conceive either from normal matings or from insemination with adequate sperm (*Tijdschr. Diergeneesk.*, Dec., 1950). The following results have a bearing on this fact:

1) Injections with large doses of FSH (follicle stimulating hormone), especially in the presence of luteal tissue in the ovaries, leads to too rapid passage of the ova down the tubes. The result of this is that either the ova do not become fertilized, or if fertilized they pass to the uterus before it is in a properly receptive state and degenerate there.

2) Degenerated fertilized ova and early embryos have been found in heifers with normal reproductive tracts.

3) Ova can be "tube-locked" by excess of estrogens and speeded up and down the tract by an excess of progesterone.

The theory was advanced that in many cases there is a slight abnormality in the estrogen-progesterone level in the blood which causes difficulties in conception.—*L. Van Es.*

Indication of Bovine Semen Fertilizing Capacity

Resazurin is a chemical indicator which, during its reduction, proceeds through a series of color changes to pink and then to white. Comparisons of this and other commonly used measures of bull semen to nonreturn pregnancy rates are reported.

This method of testing was applied to 924 semen samples from 45 bulls representing the Guernsey, Jersey, and Holstein-Friesian breeds. The results showed a highly significant correlation between the time required to reduce resazurin and nonreturn rates.—*J. Dai. Sci., Dec., 1950.*

Colostral Transfer of Antibodies

Importance of colostrum for swine and certain other species of animals is emphasized by the *J. Am. M. A.* (April 7, 1951), in commenting on animal-human aspects of a report by Young and Underdahl, University of Minnesota. In swine, the maternal and fetal circulations are separated by five tissue layers that block antibody transfer, whereas in man antibodies easily traverse the placental barrier because there is but one tissue layer. No trace of neutralizing antibodies was found in the serums of newborn pigs from sows that were immunized against influenza before pregnancy. However, the colostrum of the sows had high titers of both neutralizing and hemagglutination-inhibiting antibodies which were passed to the pigs in comparably high titers within thirty hours after nursing started.

If the patient's heart stops during anesthesia, speed in performing cardiac massage is essential. The emergency demands heroic treatment, and tardiness due to diffidence or ignorance may cost the patient his life or, at best, his senses.—*Brit. M. J., Aug. 5, 1950.*

A Case of Canine Metrorrhagia

R. H. JOURDAN, D.V.M., and H. J. HILL, D.V.M.

Fort Collins, Colorado

On May 25, 1950, a 10-month-old Boxer bitch was accidentally bred. A few hours later, she was admitted to the clinic for the purpose of preventing conception. Estrogen was used for this and failed. On July 27, or sixty days later, the bitch had a normal delivery of 5 mongrel puppies. The litter was immediately destroyed.

The patient was re-admitted to the clinic on September 1, with the history of losing weight for the past ten to fourteen days and with a sanguineous vaginal discharge. Physical examination revealed advanced cachexia; pale mucous membranes, indicating anemia; a temperature of 99.6 F.; and marked dehydration. After entry, she was observed to be active and alert, to have a good appetite, and normal elimination.

Laboratory Picture.—Samples of blood, urine, feces, and a vaginal swab were submitted to the laboratory as an aid to the clinical findings. The laboratory report on the blood sample showed a r.b.c. of 5,000,000, w.b.c. 9,000, with 52 per cent segments, 15 per cent bands, and 33 per cent lymphocytes. The urinalysis was as follows: physical—color, yellow; specific gravity, 1.01; transparency, clear. Chemical—reaction, 5.5; albumin, negative; acetone, plus or minus; indican, one plus; sugar, plus or minus; bile, negative; blood, negative. Microscopic—epithelial cells, numerous; erythrocytes, numerous; leukocytes, few; casts, none; microörganisms, none; crystals, none.

No internal parasites were found on the fecal examination. The vaginal culture had a growth of *Escherichia coli* which may have been a result of contamination.

Treatment—The therapeutic regimen consisted of whole blood, homologous canine distemper immune serum, penicillin in oil, saline-dextrose, and vitamins. Stilbestrol therapy was employed after a few days in an effort to promote uterine contraction, thus causing expulsion of the debris.

The patient's appetite, elimination, and temperature remained normal. She continued to evidence good spirits but, during hospitalization, did not pick up in flesh and the sanguineous vaginal discharge continued.

When the bitch did not show the progress that was anticipated, she was dismissed from treatment in favor of rest at home.

She was returned on September 18, exhibiting the same symptoms as previously described. Again, a vaginal swab was submitted to the laboratory and the results this time showed a growth of hemolytic Streptococcus and *E. coli*. Previous experience with cultures from vaginal swabs had shown that these two organisms are commonly isolated in normal animals. The bacteriologic findings did not aid in establishing a diagnosis.

At this time, Dr. H. J. Hill, assistant professor of surgery and clinics, Colorado A. & M. College, Division of Veterinary Medicine, was called in for consultation. Upon examination of the patient and review of the case history, his diagnosis was metrorrhagia due to a hormonal imbalance causing the uterus to remain in the proliferative stage. Progesterone and chorionic gonadotropin (L.H.)* were used in an effort to change the uterus into the secretory stage, thereby changing the cycle, with the end result of returning the endometrium to normal. The following treatment was suggested: for the first two days, 10 mg. of progesterone, then 5 mg. for each of the next three days. On the sixth day, 2,500 units of chorionic gonadotropin were administered parenterally and 2 mg. progesterone was given daily for seven days. At the end of the week, the second dose of 2,500 units of chorionic gonadotropin was administered.

This treatment was carried out along with general supportive measures. On October 3, treatment was terminated and the patient was discharged from the hospital. At this time, abnormal vaginal discharge was beginning to subside.

The patient was entered for examination on Oct. 17, 1950, exhibiting estrus, and a marked improvement was noticed in her physical condition. The owner was advised to return with her about one week following the termination of her heat period. She was again entered on November 9, when the genital tract was found to be normal in all respects. Examination on Jan. 15, 1951, revealed there had been no further hormonal disturbances.

From the Department of Veterinary Medicine, Colorado A. & M. College, Fort Collins.

*Luteinizing hormone.

CLINICAL DATA

Clinical Notes

Thirty-three cases of human infection with Newcastle disease virus have been reported.—*J.Am.M.A., Jan. 13, 1951.*

Heptachlor, new insecticide closely related to chlordan, is said to be more volatile and, therefore, less likely to leave toxic residues.—*Tech. Survey, Nov. 11, 1950.*

Brucellosis in swine develops as a bacteriemia. This disease in swine is similar, in some respects, to that in man. Recovery may be spontaneous in both.—*L. M. Hutchings, D.V.M., Dept. of Veterinary Science, Purdue University, La Fayette, Ind.*

The adrenal cortex exerts an effect on a number of constituents of the clotting mechanism and, in some instances, may significantly alter clotting time when its function is accelerated.—*Science, Sept. 15, 1950.*

Studies on human patients showed that cautious use of phenylindandione (danilone), a new product, meets the clinician's need for an anticoagulant intermediate in action between heparin and dicumarol.—*Current M. Digest, Aug., 1950.*

Neostigmine methylsulfate subcutaneously or intravenously gives dramatic relief within a few seconds to patients suffering from procaine "hypersensitivity," characterized by dizziness, apprehensiveness, trembling, and palpitation.—*Current M. Digest, July, 1950.*

Parasite Egg Production.—The egg output of the intestinal parasites is lowest in early winter and highest in spring and early summer. The weather conditions may influence the height and duration of the spring peak of worm egg production.—*J. Helminthol., 24, 1950: 101-122.*

When vaccinating, don't underestimate the weight of pigs, warns the University of Illinois. They may be heavier than you think.

Despite recent favorable reports, hormone treatment of ewes to produce two lamb crops a year is impractical at present for commercial sheep raisers.—*Univ. of Illinois.*

Johnin Test.—The thermal test using avian tuberculin intravenously is the test of choice in individual cases of Johne's disease, according to L. P. Prewett (*Austral. Vet. J.*, Aug., 1950:213-220). In general, however, it is concluded that the johnin test is "most unreliable."

Hyperkeratosis in Illinois.—The present status of hyperkeratosis and the prevalence in the state of Illinois is discussed in an eight-page leaflet (Circular 656, University of Illinois, College of Agriculture, Urbana, April, 1950) by C. C. Morrill, D.V.M., and R. P. Link, D.V.M., entitled "X-Disease (Hyperkeratosis) of Cattle in Illinois."

Transmissible gastroenteritis of pigs has not responded to treatment with antibiotic drugs and sulfonamides in controlled experiments. The best way to control the disease is to move healthy pigs away from the sick ones, keeping litters as far apart as possible.—*L. P. Doyle, D.V.M., Indiana.*

It is easy to confuse *Escherichia coli* infection with feline panleucopenia. Treatment with streptomycin offers promise against both diseases.—*W. F. Irwin, D.V.M., Oklahoma.*

On the Topography of the Equine and Bovine Spinal Cord

(An Abstract)

The mounting interest in nervous disorders of large animals has emphasized our need for precise neurologic information presented in such a manner as to be useful to the clinician. This article, with the accompanying plates, is a valuable aid in relating the segments of the spinal cord to skeletal landmarks.

In the early fetus, the spinal cord extends to the end of the tail. The spinal nerves leave the cord at right angles and pass out through the intervertebral foramina located opposite the origins of the nerves. The segment of the cord that gives rise to each nerve lies half in the vertebra cranial to the foramen, and half in the next caudal vertebra. In subsequent prenatal and postnatal development, the growth of the vertebral column is faster than that of the spinal cord, producing a relative shortening of the cord and an apparent cranial displacement of the segments (ascensus medullae). This draws out the sacral and coccygeal nerves to form the cauda equina, and causes successive lumbar nerves to run caudad in the spinal canal for increasing distances before they reach their intervertebral foramina. The degree of shortening varies in different species. In adult man, the end of the cord is between the L 1 and L 2 vertebrae.* In the dog, it is at the last lumbar vertebra.

Dorsal exposures of the spinal cord were made on 5 horses and 5 cows embalmed in a normal standing position. These were aged animals in which the spinal cord had undergone the maximum amount of relative shortening. The studies of sagittal sections were made from slaughtered animals.

Horse.—The end of the spinal cord, taken as the point where the conus medullaris gives off the last pair of coccygeal nerves and becomes the filum terminale, was at the junction of the S 1 and S 2 vertebrae. The dural sheath extended back to the S 4 vertebra. Because the arachnoid was adherent to the inside of the dura, the subarachnoid space with the contained cerebrospinal fluid was practically coextensive with the dural sheath.

The diameter of the cord was greatest at the cervical and lumbar enlargements, where it was 22 mm. At the lumbosacral foramen, the diameter was 12 mm.

The relation of the segments of the cord to the bodies of the vertebrae may be summarized as follows:

1) From C 1 to L 4, the segments coincided roughly with the vertebrae of the same number.

2) There was a slight cranial displacement of the entire cervical cord. In T 1 and T 2, and again from T 10 to L 2, there was a slight caudal displacement of the segments. The T 3 to T 9 segments lay almost directly on the bodies of the vertebrae of the same number.

3) The last two lumbar segments and the sacral and coccygeal parts of the cord were the only portions which had undergone a significant cranial displacement that increased in degree with successive segments.

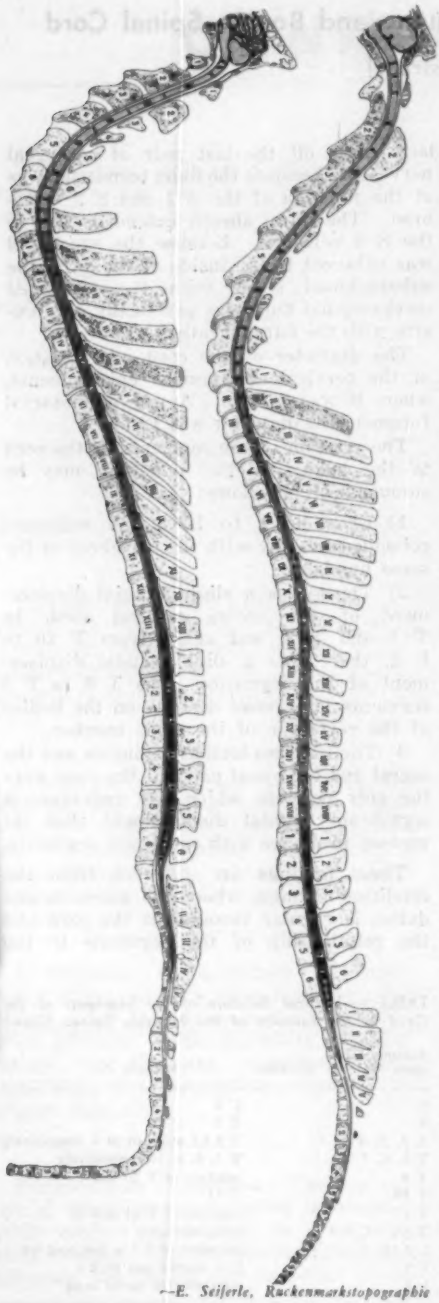
These findings are different from the condition in man, where the ascensus medullae is regular throughout the cord and the relationship of the segments to the

TABLE I—Vertical Relation of the Segments of the Cord to the Summits of the Palpable Spines (Cow)

Summit of spine No.	Overlies	Segment No.
C 7		C 8
T 1		T 2
T 2, 3, 4		T 3,4,5 and part of 6, respectively
T 5, 6, 7, 8		T 7, 8, 9, 10, respectively
T 9		junction of T 10 and 11
T 10		T 11
T 11		junction of T 11 and 12
T 12, 13, L 1		same segments
L 2, 3, 4		junctions of L 2-3, 3-4, and 4-5
L 5		L 6, cranial part of S 1
L 6		remainder of sacral cord

This abstract of the article, "On the Topography of the Equine and Bovine Spinal Cord," by Prof. Eugen Seiferle, Institute of Veterinary Anatomy, University of Zurich, which appeared in the Zeitschrift fur Anatomie, 110, (1939):371-384, was prepared by Dr. Robert E. Habel, associate professor, Department of Anatomy, New York State Veterinary College, Cornell University, Ithaca, N. Y.

*The following abbreviations are used in this abstract: L 1 = first lumbar, L 2 = second lumbar, etc.; S 1 = first sacral, S 2 = second sacral, etc.; C 1 = first cervical, C 2 = second cervical, etc.; T 1 = first thoracic, T 2 = second thoracic, etc.



—E. Seiferle, Ruckenmarkstopographie

vertebrae may be expressed by simple rules of thumb.

The relations of the summits of the palpable spinous processes to the segments of the cord were determined. From the T 2 to the T 9 vertebrae, the summits of the spines were vertically above the cord segment of the next higher serial number. From T 10 to L 5, the spinous process coincided with the corresponding segment of the cord. The L 5 spine also overlay a part of the L 6 segment. The L 6 spine was above the S 1 and S 2 segments of the cord. The S 3 to S 5 segments were at the lumbosacral foramen.

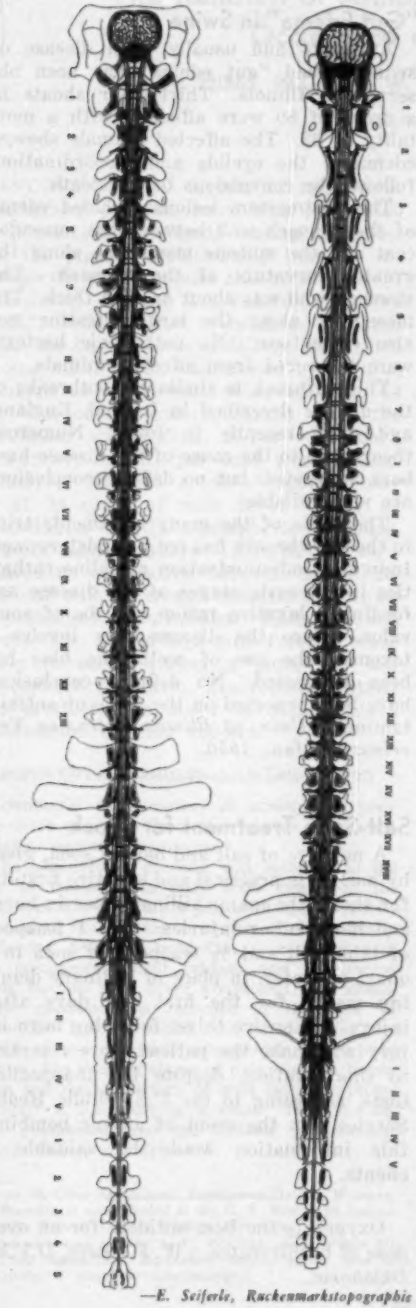
The spinal ganglia were found inside the vertebral canal from C 1 to C 6. Caudal to that point, they were in the intervertebral foramina or just outside. They were more exposed from T 10 to L 6. The sacral ganglia were inside the sacral canal.

In locating injuries to the spinal cord, and in making diagnostic use of referred tenderness and rigidity, it would be helpful to know the area of skin supplied with sensory fibers from each spinal nerve (dermatome). These areas have been worked out in great detail in man. In this paper, the cutaneous areas innervated by each region of the cord are described, with more detailed information on the cervical nerves.

The ventral branches of the C 1 and C 2 nerves innervate the caudolateral surface of the ear, the ventral buccal and masseteric and entire parotid regions, and the mandibular space. The ventral branches of the remaining six cervical nerves innervate the ventral three-fourths of the neck, the breast, the sternal region back to the plane of the olecranon, and the dorsal and dorsomedial surface of the forearm and metacarpus. A strip, about a hand's breadth wide, just cranial to the collar bed receives its innervation from the ventral branch of C 5. The cervical nerves to the limb and pectoral region are the sixth, seventh, and eighth, via the brachial plexus.

The dorsal branch of C 1 is distributed to the occipital region and the caudomedial surface of the ear. The region over the atlas and axis is supplied by the dorsal branch of C 2, and the remainder of the

Fig. 1—Sagittal sections of the vertebral column (left, cow; right, horse), showing the relationship of the cord segments to the vertebrae.



—E. Seiferle, Ruckenmarkstopographie

top of the neck back to the withers is supplied by C 3 to C 8.

The dorsal branches of the thoracic nerves extend farther ventrad, innervating the withers, the dorsal scapular region, the back, the dorsolateral thoracic wall, and the abdominal wall down to the fold of the flank. The ventral branches of T 1 and T 2 supply the ventral scapular and the shoulder, brachial, and elbow regions. T 1 and T 2 also pass through the brachial plexus and, together with C 8, supply the lateral and volar surface of the limb and the entire digit. The remainder of the ventral thoracic nerves conduct sensation from the ventral thorax and abdomen.

—E. Seiferle, Ruckenmarkstopographie

Fig. 3—Enlargement of lumbosacral region of the horse, from figure 1.

The dorsal branches of the lumbar nerves supply sensation to the loin, cranial gluteal region, and a strip of the lateral thigh cranial to the hip joint. The ventral branches of the lumbar nerves innervate the cranial thigh and stifle and, via the saphenous nerve, the whole medial surface of the crus and a small strip of metatarsus to the fetlock.

—E. Seiferle, Ruckenmarkstopographie

Fig. 4—Enlargement of lumbosacral region of the cow, from figure 1.

The dorsal branches of the sacral nerves supply the caudal gluteal region and a strip of skin extending ventrad over the hip joint to the level of the stifle. All of the

Fig. 2—Dorsal dissections of the vertebral column (left, cow; right, horse), showing the relationship of the cord segments to the vertebrae and the intravertebral course of the spinal nerves.

remaining cutaneous surface of the limb receives its innervation through the lumbosacral plexus from the ventral branches of L 6 and S 1, S 2, and S 3. The ventral branches of S 4 and S 5 supply the perineal region through the pudendal and caudal hemorrhoidal nerves.

The skin of the tail and the root of the tail are innervated by coccygeal nerves from the conus medullaris.

Ox.—The transition from conus medullaris to filum terminale was in the first sacral vertebra. The diameter of the conus at the lumbosacral foramen was 4 mm. It should be noted that these observations were on aged animals. According to Weber,[1] the cord extends to the third sacral vertebra at 2 months, and to the second at 10 months of age. The diameter of the cord at the lumbosacral foramen is, therefore, greater in young animals. The dural sheath, containing the arachnoid with the arachnoid space and cerebrospinal fluid, extended to the S 4 vertebra.

The relation of the segments of the cord to the bodies of the vertebrae may be summarized by regions:

1) In the cervical cord, there was a cranial displacement that increased with successive segments.

2) Thoracic segments 1, 8, 12, and 13 coincided with the bodies of the vertebrae. T 2 to T 7 were displaced craniad and T 9 to T 11 were displaced caudad.

3) The lumbar and sacral segments were displaced craniad to a degree that increased caudally.

The vertical relation of the segments of the cord to the summits of the palpable vertebral spines is set forth in the table 1.

The spinal ganglia were located in or close to the intervertebral foramina. The caudal sacral ganglia were inside the sacral canal.—ROBERT E. HABEL, D.V.M.

Ontario Veterinary College has reported highly encouraging results with oral streptomycin in preventing and treating white scours in calves due to *Escherichia coli*. The recommended dose is 250,000 units (0.25 Gm.) daily for four days.

[1]Weber, W.: Anatomisch-klinische Untersuchungen über die Punktions-und Anästhesiestellen des Rückenmarkes und über die Lage des Gehirnes beim Rind. Schweiz. Arch. f. Tierheilk., 84, (1942): 161-173.

"Gut Edema" in Swine

An acute and usually fatal disease of swine named "gut edema" has been observed in Illinois. Thirty-four shoats in a drove of 80 were affected, with a mortality of 32. The affected animals showed edema of the eyelids and incoördination, followed by convulsions before death.

The postmortem lesions included edema of the stomach wall between the muscular coat and the mucous membrane along the greater curvature of the stomach. The stomach wall was about an inch thick. The mesentery along the large intestine was also edematous. No pathogenic bacteria were recovered from affected animals.

This outbreak is similar to outbreaks of the disease described in Ireland, England, and more recently in Iowa. Numerous theories as to the cause of the disease have been suggested, but no definite conclusions are yet available.

The value of the many treatments tried in these outbreaks has not been determined. Individual administration of saline cathartics in the early stages of the disease and feeding a laxative ration may be of some value. Since the disease may involve a toxemia, the use of methylene blue has been suggested. No definite conclusions have been reported on the value of antihistamines.—*Univ. of Illinois Extension Veterinarian, Jan., 1950.*

Salt-Soda Treatment for Shock

A mixture of salt and baking soda, given by mouth, is practical and effective first-aid for shock, the major killing factor in burns and many other injuries. Use 1 teaspoon of table salt and ½ teaspoon of soda in 1 quart of water, in place of ordinary drinking water, for the first few days after injury. Intensive thirst following burn injury will make the patient more receptive to this solution, despite its unappealing taste, according to the U.S. Public Health Service. In the event of atomic bombing, this information would be valuable to clients.

Oxygen is the best antidote for an overdose of barbiturates.—*W. F. Irwin, D.V.M., Oklahoma.*

The Relation of Atmospheric Pressure to the Occurrence of Milk Fever

J. W. HIBBS, Ph.D., and W. D. POUNDEN, D.V.M., Ph.D.

Wooster, Ohio

MANY PREDISPOSING factors of milk fever (parturient paresis) have been postulated as previously discussed,[2] among them being the possible relationship between atmospheric pressure and the occurrence of milk fever. Krogoe and Petersen (Hutyra *et al.*[3]) believed that more cases occurred when the barometer was falling than when it was high. This was denied by Stenius (Hutyra *et al.*[3]) who observed that 54 per cent of the cases occurred when the barometer was falling, 9 per cent when stationary, and 37 per cent when rising. Stenstrup (Hutyra *et al.*[3]) reported only 15 of 94 cases of milk fever during or following a fall in atmospheric pressure. Heately and Dryerre (Hutyra *et al.*[3]) showed no correlation between the occurrence of milk fever and climatic conditions in prolonged observations. Hallgren[1] and Morin[4] also denied that milk fever is more likely to occur during a period of low atmospheric pressure. The following study was conducted in order to obtain added information on this subject.

EXPERIMENTAL RESULTS AND DISCUSSION

Continuous daily records of atmospheric pressure were available from the records of the experiment station climatologist.*

The atmospheric pressure was recorded at the time of treatment in milk fever cases and the trend was noted during a period of approximately twenty-four hours prior to treatment. In normally freshening cows and borderline cases (cows with low postpartum blood calcium and phosphorus levels but no milk fever symptoms), the atmospheric pressure was recorded at the time of parturition and the trend was noted during the period of approximately twenty-four hours postpartum. The average elapse of time between parturition and the appearance of milk fever symptoms was 21.7 ± 7.1 hours in 36 cases. Thus, the 24-hour postpartum and the 24-hour pretreatment periods closely corresponded.

Data were available on 40 milk fever parturitions and 4 borderline cases in Jersey cows. These were compared, as previously described, with 40 normally freshening cows.

TABLE I—The Relation of Atmospheric Pressure to the Occurrence of Milk Fever

Cows (No.)	Mean pressure* (inches of Hg)	Trend of atmospheric pressure*		
		Rising	Falling	Steady
		Normal Parturitions		
40	29.87 ± 0.22	12	13	15
		Milk Fever Parturitions		
40	29.86 ± 0.26	12	12	16
		Borderline Parturitions		
4	29.81 ± 0.10	0	2	2

*In normal parturitions and borderline cases, the atmospheric pressure was recorded at parturition and the trend was noted for approximately twenty-four hours postpartum. In milk fever cases, the atmospheric pressure was recorded at the time of treatment, and the trend was noted for approximately twenty-four hours before the onset of milk fever.

Examination of the data in table 1 shows that the average atmospheric pressure measured in inches of mercury was essentially the same at parturition in both normal cows and borderline cases and at the time of treatment in milk fever cases. Further, the trends in atmospheric pressure during the 24-hour postpartum period in normal and borderline parturitions and the 24-hour pretreatment period in milk fever cases were found to be similar.

On the basis of the data presented, it is concluded that the occurrence of the milk fever attacks were not influenced by changes in atmospheric pressure.

SUMMARY

The average atmospheric pressure at parturition in 40 normal and 4 borderline cases (cows with low postpartum blood calcium and phosphorus levels, but no milk fever symptoms) was 29.87 ± 0.22 and 29.81 ± 0.10 in. respectively. In 40 cases of milk fever, the average atmospheric pressure at the time of treatment was 29.86 ± 0.26.

The trends in atmospheric pressure during the 24-hour postpartum period in normal and borderline cases and the 24-hour pretreatment period in milk fever cases were recorded as rising, falling, or steady. No marked differences in these trends were

From the Ohio Agricultural Experiment Station, Wooster. Dr. Pounden is now located at the U. S. Bureau of Animal Industry, Animal Disease Station, Beltsville, Md.

*The assistance of Mr. J. T. McClure, climatologist for the Ohio Agricultural Experiment Station at the time of this study, is gratefully acknowledged.

found. In normal parturitions, the atmospheric pressure trend was rising in 12, falling in 13, and steady in 15. In milk fever parturitions, it was rising in 12, falling in 12, and steady in 16. In 2 of the 4 borderline cases, it was falling and in 2 it was steady. The average time between parturition and the milk fever attack was 21.7 ± 7.1 hours. Thus, the 24-hour postpartum and the 24-hour pretreatment periods closely corresponded.

It is concluded that the occurrence of the milk fever attacks were not influenced by changes in atmospheric pressure.

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[1]Hallgren, W.: Etiology and Pathogenesis of Milk Fever in Cattle—Preliminary Communication. Skand. Vet., *29*, (1939): 253-268. (Nutr. Abstr. and Rev., *9*, (1939): 243.)

[2]Hibbs, J. W.: Milk Fever (Parturient Paresis) in Dairy Cows—A Review. J. Dai. Sci., *33*, (1950): 758-789.

[3]Hutyra, F., Marek, J., and Manninger, R.: Special Pathology and Therapeutics of the Domestic Animals. 3rd ed. Vol. III. Alexander Eger, Chicago, (1926): 514.

[4]Morin, L. N.: Observations on Parturient Paresis and Related Conditions. North Am. Vet., *21*, (1940): 465-470.

Danger of Poisoning from Copper Sulfate in Drinking Water for Cattle

The item in the April, 1951, JOURNAL (p. 241) relating to medication of cattle for stomach worms by adding copper sulfate to their drinking water has brought comment from two members who call attention to the possible danger of such a method. Dr. R. D. Turk, head of the department of veterinary parasitology, Texas A. & M. College, refers to the occurrence of chronic copper poisoning from repeated and long-continued ingestion of relatively small amounts of copper sulfate, as reported by Boughton and Hardy (*Texas Agric. Exper. Sta. Bull. 499, 1934*). Dr. Hilton A. Smith, head of the department of veterinary pathology at Texas A. & M., also calls attention to the dangers of administering a potentially harmful drug over a long period under uncontrolled conditions of dosage.

Dr. Turk also states that their staff is continually observing copper poisoning where well-meaning individuals have placed copper sulfate in mineral mixtures to prevent worms in sheep.

Rabies in a Beaver

On March 2, 1951, the University of Missouri, School of Veterinary Medicine, Ambulatory Clinic, encountered a case of rabies in a 31-lb. male beaver (*Castor canadensis*). The beaver was seen on the lawn of Mr. Derby Bass' home in Columbia, Mo., at 9:00 p.m., fighting with his dog. Mr. Bass rushed to the aid of his dog but was driven back into his house by the beaver. Mr. Bass returned to the scene with a flashlight and gun and shot the beaver in its side. On March 3, I made a laboratory diagnosis of rabies when typical Negri bodies were demonstrated by a microscopic examination of stained smears from the hippocampus of the brain.—*H. H. Berrier, D.V.M., Department of Clinical Pathology, University of Missouri, Columbia.*

Prevention of Bracken Fern Poisoning

A method of preventing bracken fern poisoning of cattle has been suggested by Boddie who states that "many experienced agriculturists are firmly of the opinion that they can avoid losses among their hill cattle by removing them to low ground free from bracken at three-weekly intervals. He suggests that heavy mortality of cattle from bracken poisoning occurring in many parts of Scotland in 1946 might be due to the requirements of the Hill Cattle Subsidy Scheme (1946), which stated that cattle must be on the hill continuously for sixteen weeks." Stamp states that his experiences in Scotland during the summer and autumn of 1946 would also suggest that alternative grazing appeared to prevent the disease.

This information should be of interest to southern veterinarians who are faced with this problem. The newly developed chemical weed killers, 2-4D and esteron are not effective against bracken fern.—*William L. Sippel, D.V.M., Tifton, Ga.*

Cortisone in Equine Arthritis.—Veterinarians at the Kentucky Agricultural Experiment Station plan to conduct extensive experiments with adrenal hormones for treating arthritis in foals, according to *The Blood-Horse* (Nov. 11, 1950). Some practitioners already have used cortisone and similar products on individual cases, with results ranging from good to indifferent.

Phenothiazine-Hexachloroethane Mixture in Control of Sheep Parasites

DOUGLAS F. WATSON, V.M.D.; MILAN O. VELIZ, D.V.M.;
TOMAS PAREDES J., D.V.M.

Pachacayo, Peru

THE WORK reported herein was done in the laboratory and hospital of the veterinary department of the Sociedad Ganadera de Junin, an organization operating haciendas carrying up to 200,000 sheep.

This report on some experiments with a combination of drugs for the control of parasites in sheep may be considered as supplementary to a previous report published by one of us.[1]

In previous reports,[1] the sheep on our farms have suffered from heavy infections with Nematoda, Taenia, and Fasciola. In the last three years, by the methods described,[1,4] we have been able to reduce the mortality on our farms from 25.0 to 4.5 per cent which, while encouraging, still leaves room for improvement. We have been able to control, to a satisfactory degree, both the Taenia and Nematoda groups by individual dosing with phenothiazine, copper sulfate, and nicotine sulfate (referred to hereafter as basic mixture or SCNF) once a year, and by making accessible to the sheep throughout the year a standard 1:14 phenothiazine and salt mixture fortified with necessary minerals. By using carbon tetrachloride ($C\ Cl_4$), oil (1:4), and hexachloroethane (H),[2] we can control Fasciola. Recently, we dosed 183,468 sheep with the basic mixture, SCNF. This mixture, minus the nicotine sulfate, has been successfully used on cattle in appropriate doses with equal results. Some 259,637 sheep have been dosed with $C\ Cl_4$ and oil, and 22,501 with the H as described by Olsen.[2]

We are still looking for better drugs, combinations of drugs, and methods of using them. Moving large numbers of sheep long distances for dosing imposes a further load on the sheep and presents economic problems. We seek a nontoxic mixture which can be administered in one dose and which will offer a good control of the three genera of parasites mentioned. The number of dosings required annually is a matter of economic importance when 200,000 sheep are scattered over nearly a million acres of land.

Each 2-oz. (adult) dose of SCNF contains 25 Gm. of phenothiazine dissolved in the standard 2 per cent copper sulfate-nicotine sulfate solution.

We first used hexachloroethane (H) in the form of 20-Gm. boluses. Later, we used a wettable powder which mixed well with SCNF. It required 1½ oz. of water to properly dissolve 20 Gm. of hexachloroethane, when this was added to 2 oz. of SCNF. This was given by means of the Whitlock ball-end dosing nozzle.

To evaluate this mixture as an agent for parasite control, and to study possible toxicity or incompatability, we used it on 49 sheep of various ages and both sexes. These animals were purchased from flocks which had never been subjected to any form of parasite control.

To estimate the degree of infection, the number of parasite eggs per gram of feces was determined, using the method of Stoll. The feces were secured directly from the rectum and both Fasciola and Nematoda eggs were counted. Three counts were made at 24-hour intervals, and the average taken as the degree of infection. The following classes of eggs were observed: Trichostrongylus, Ostertagia, Haemonchus, Nematodirus, Bunostomum, Cooperia, Oesophagostomum, Chabertia, and Fasciola. The presence of Moniezia was indicated by segments in the feces. Difficulties were met in securing sufficient feces at various times because of copious mucus in the rectum. Another discrepancy was ability to find only a few eggs after the initial examination had revealed a large number of eggs. Similar experiences are reported by

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The assistance of Srtas. Berta Parra and Luz Sarmiento in the egg count procedure is gratefully acknowledged.

many investigators and perhaps are best explained by the work of Gordon.[3]

As soon as we established an average of the degree of infection, the dosing of the animals was begun. The animals were separated into lots and each animal was identified by an ear tag and number, and each group was further identified by being marked with distinctively colored crayons. One lot was dosed with SCNF, the second lot with SCNF+H, and the third lot with H alone. The treatment was used as a mixture and also in its two component parts, to determine any incompatability or toxic reaction. In no case were the animals starved before dosing, and the medicine was introduced directly into the rumen by means of the ball-end dosing nozzle.

TABLE 1—Parasite Eggs per Gram of Feces

Eggs/Gm. of feces before treatment (Ave. 3 counts)			Treated	Eggs/Gm. of feces after treatment (16 days)	
Sheep	Fluke	Nematoda	with	Fluke	Nematoda
652	45	45	SCNF	0	0
654	130	35	SCNF	200	0
659	0	20	SCNF	100	0
662	0	100	SCNF	100	0
663	50	25	SCNF	50	0
675	0	50	SCNF	0	50
678	250	85	SCNF	300	0
680	100	185	SCNF	300	200
681	300	150	SCNF	800	0
687	400	225	SCNF	300	0
695	125	25	SCNF	50	0
696	0	85	SCNF	0	0
Ave.	117	86		183	24
664	50	80	H	50	0
672	370	120	H	0	0
674	50	35	H	100	200
683	35	90	H	0	0
684	0	50	H	0	0
685	80	0	H	0	0
690	140	35	H	0	0
691	75	75	H	0	0
Ave.	100	61		19	25
655	170	60	SCNF.H	0	0
658	35	140	SCNF.H	0	0
661	70	80	SCNF.H	0	100
666	35	270	SCNF.H	0	0
667	650	350	SCNF.H	0	50
669	100	120	SCNF.H	180	200
670	150	250	SCNF.H	0	0
671	220	125	SCNF.H	150	550
677	360	150	SCNF.H	0	100
679	70	175	SCNF.H	0	100
686	75	100	SCNF.H	0	100
689	35	20	SCNF.H	100	200
692	400	275	SCNF.H	0	0
693	120	170	SCNF.H	0	0
694	45	80	SCNF.H	0	0
697	350	200	SCNF.H	0	100
698	80	35	SCNF.H	0	0
700	370	300	SCNF.H	0	0
Ave.	185	161		24	83
604	50	0	Control	300	0
605	400	200	Control	0	100
653	80	100	Control	100	0
657	1350	270	Control	500	200
663	70	190	Control	100	100
668	55	1	Control	200	0
669	120	70	Control	100	200
689	35	20	Control	100	200
Ave	270	105		175	100

Egg counts were again made forty-eight hours, seventy-two hours, and sixteen days after dosing. Certain discrepancies were noted. Some animals continued to pass Nematoda eggs for sixteen days after the dosing although they were negative for Fasciola eggs. Others eliminated both types of eggs simultaneously or alternately on subsequent counts. Some animals, dosed with H alone, remained positive for Fasciola and negative for Nematoda. Some control animals were negative for one type or another at the sixteen-day count. These discrepancies may be due to the fact that all animals were allowed free access to the 1:14 phenothiazine and salt mixture at all times. This practice was followed because it is the system used on our farms and we wished to evaluate this mixture under the usual conditions and practices. Other discrepancies may be due to the varying susceptibility of sheep of different age and sex, to physical condition, or to the susceptibility of the different types of eggs to the drugs.[3,5,6]

TABLE 2—Percentage of Positive Sheep Showing No Eggs Sixteen Days After Treatment

Treated with	Fluke	Nematoda
SCNF	12.5	83.0
H	71.0	86.0
SCNF.H	83.0	50.0
Controls	12.5	17.0

The last phase of the work consisted of the autopsy of 13 animals with careful examination and counts of all living and dead parasites. Three animals dosed with SCNF had 4, 3, and no Nematoda, respectively. These animals had Fasciola in accordance with egg counts. Animals with positive Fasciola egg counts and dosed with SCNF +H were free of live Fasciola. All showed lesions indicative of previous fluke infections. These animals showed few Nematoda, although they were not specifically dosed against this type of parasite but had access to the salt mixture. These animals were all secured from outside sources where no salt was given; therefore, it may be assumed that they consumed more of the mixture than animals which had always been offered free access to it.

In closing, work started by one of us (D.F.W.) on a small scale may be of interest. We mixed 7 per cent of hexachloro-

ethane in the standard 1:14 salt mix. At first, the animals refused to eat this, undoubtedly due to the strong (camphor-like) odor. However, when fed no other type of salt, they soon began to eat the mixture. Some 3,000 bred ewes and more than 3,000 ewe lambs are now receiving it. It is contemplated that these animals will remain on this mixture indefinitely and that other medication against flukes will be used only if necessary. All animals that die are examined for live flukes. As the old ewes are slaughtered, they will be examined. We also have a small lot of old purchased ewes, heavily infected with flukes, that were bred and which have lambed. These animals are all receiving this mixture and no other medication has been given. It is contemplated that these animals will remain on this mixture for life, as well as the ewe lambs to be bred and their lambs. All dead animals will be closely checked. We hope to reach a definite conclusion concerning the value of the mixture in the field. Further reports will be made.

SUMMARY

A mixture of phenothiazine, copper sulfate, nicotine sulfate, and hexachloroethane (SCNF+H) was used on 49 head of sheep to determine its value in control of parasitism with Fasciola, Nematoda, and Taenia.

An average of three fecal egg counts before dosing served as a basis for estimating the degree of parasitism.

The mixture was used on one group as phenothiazine, copper sulfate, and nicotine sulfate (SCNF), on another group as hexachloroethane (H) alone, and on another group as a composite mixture of all the drugs mentioned. A control group was also provided.

Egg counts were made at forty-eight and seventy-two hours and at sixteen days after dosing. Thirteen animals were autopsied and live parasites were counted.

No cases of intoxication were noted nor did it appear to affect the appetite or sexual cycle of the animals.

When given as individual doses, and used in conjunction with the standard 1:14 phenothiazine-salt mixture (with or without the addition of hexachloroethane), this mixture appears to offer a system of treatment and prophylaxis which can be used on large haciendas (ranches) where frequent dosing presents an economic problem.

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Dog-Transmitted Leptospirosis in Man.—A case of human meningitis belatedly diagnosed as *Leptospira canicola* infection (*Brit. M. J.*, Feb. 3, 1951) is of interest to veterinarians because it appeared to have been contracted from a dog. Signs of meningeal irritation are not unusual in human leptospirosis, according to the British report, but diagnosis is difficult because the condition simulates poliomyelitis, choriomeningitis, and related maladies.

Prevention of Canine Eclampsia.—Acute gastric indigestion is a factor in eclampsia. Apomorphine treatment following intravenous calcium almost invariably induces vomiting of large chunks of meat or rich, meaty stew. To prevent recurrences, the owner should be warned against feeding meat for a short time following an attack.—*F. G. Steinbach, V.M.D., Univ. of Pennsylvania Bull., Oct. 21, 1950.*

It is unfortunate that many veterinarians do not stress the necessity of a strict herd-sanitation program in conjunction with calfhood vaccination.—*Ann. Rep., Ontario Veterinary College, 1949.*

Pathologic studies of sheep which died of cobalt toxicosis showed fatty infiltrations of the liver, slight pulmonary edema, and hemorrhages in the small intestine.—*J. Anim. Sci., Feb., 1951.*

Lumbar Paralysis of Ovine Species in Japan Reportedly Caused by Setaria Digitata

DONALD L. BUSH, D.V.M., M.S.

THE MAJORITY of the goats in Japan are the so-called "native" goats which were originally imported from Korea and China. Records of forty-five years ago indicated a goat population of 30,000. These original breeds were crossbred so that the goats seen today are the native goats. It was reported by the Ministry of Agriculture and Forestry that pure strains of the Chinese breed are located in Kagoshima Prefecture, Kyushu Region, and in Okinawa. More recently, British and Swiss Saanen breeds were imported into Japan and many were crossbred with the native strains. The Saanen breed was used as the basic breed for meat and milk production. Of the American breeds which were brought to Japan, it was planned to maintain the lines by inbreeding. Therefore, the Nubian and Toggenburg breeds have not been crossed with native strains. In Nagasaki Prefecture, the mutton-type goat predominates over the milking type.

Ministry of Agriculture and Forestry records show that from 1937 to 1941 more than 67,000 Corriedale sheep were imported from Australia. The 1949 census reported 176,094 female and 89,265 male Corriedales, giving a total of 265,359. There were 35,947 Merino sheep (21,940 females and 14,007 males). Other breeds are crossbred Corriedale, Merino, Cheviot, and Shropshire; these amount to 26,184, of which 17,437 are females and 8,749 are males.

The breeding programs which have been outlined by the Ministry of Agriculture and Forestry have stressed inbreeding among sheep and goats (table 1).

Clinical Manifestations.—The following clinical manifestations were seen in the field:

a) Marked undernourishment even though the appetite remained good. Disturbance in rumination often seen.

b) Temperature, pulse, and respiration normal.

c) Bending and bowing of the legs; legs spread apart, stumbling gait.

d) Stiffness of the front legs resembling articular rheumatism.

e) Enlargement of the carpal joints and beading of the ribs in some animals.

f) Dullness of the hair, general unthriftiness and, in some cases, alopecia.

g) Marked anemia, pale to whitish mucous membranes. Anemia persisted in all animals even when wormed and placed on good rations. No improvement was seen in a two-month period of observation as indicated by laboratory tests.

h) Eclampsia occurred in some of the females following parturition.

i) Defecation and urination normal.

j) Atrophy of the gluteal, gastrocnemius, semitendinosis, semimembranosis, vastus lateralis, and rectus femoris muscles.

TABLE 1

Year	Goats	Sheep
1934-1936 (ave. 3 yr.)	123,000	48,000
1945	205,323	180,000
1946	221,725	196,425
1947	277,980	239,427
1948	347,807	290,987
1949	458,000	327,000
1950 (June est.)	644,000	459,000

k) In some of the diseased animals, corneal opacity with ulceration was observed.

l) Tetany and nystagmus occurred in the late stages and the animals succumbed in a matter of hours. This was noted in both the male and female of the species.

m) Weakening of the hindquarters occurred so that the animals sat dog fashion. Sometimes there was loss of muscular tone and twitching of the muscles, hypersensitiveness of the limbs, dragging of the hind legs, and inability to jump or clear obstacles.

n) In all of the cases observed, there was sensation, and a true paralysis did not exist.

o) When nursing does or ewes were affected, the kids or lambs appeared to be in perfect health so long as they received a sufficient quantity of milk.

p) The disease was usually chronic and ran a course of six weeks to six months or more. Throughout the period, there occurred occasional periods of remission. Furthermore, there were some relapses each year.

Acknowledgement is given to Drs. Kobayashi, Ishii, and Watanabe of the National Animal Hygiene Experiment Station and to Dr. Tanaka of the Ministry of Agriculture and Forestry for aid and coöperation in carrying out these experiments on a national level.

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Laboratory Findings and Observations in the Field.—Feeding.—Rations on Japanese farms are substandard and consist mostly of grass or genya hay or weed grass, seeds, leaves, artificial preparations or by-products of meals, bran (rice or wheat), tubers and roots, such as diakons and potatoes, soup skimmings, and vegetable peelings. A large quantity of corn stalks and leaves are fed during the summer and fall. Bran (rice or wheat) is in many cases the main feed.

Prefectural farms, in general, feed more rations than the average Japanese farmer, but not necessarily of the desired type. Large quantities of calcium preparations are fed which may tie up the phosphorus and result in a phosphorus deficiency.

National farms undoubtedly feed the best, at least in quantity.

Observation of feeding programs reveals that the best rations fed by any agency are fed to lactating cows; this ration usually contains feeds which contribute to a better balanced diet.

Animal Husbandry.—The better does should yield about 4,000 cc. of milk per day and continue to milk for seven months or more. On the basis of body weight and the amount of feed consumed, good milk goats are almost as efficient milk producers as are good cows. However, maintenance requirements for goats per 100 lb. of live weight are considerably higher than for cows, because of their much smaller size and consequent greater body surface in proportion to live weight. Also, for the production of each pound of fat, goats apparently require more digestible nutrients above the maintenance requirement than do cows. Moreover, they are able to consume more feed per 100 lb. of live weight than cows of high productive capacity. The cost of producing goat milk on a commercial basis is therefore much higher.

In goat husbandry in Japan, the above mentioned factors are not taken into consideration in so far as lactating goats are concerned.

Lactation.—All females were yielding 2,000 to 4,000 cc. of milk per day. Goats give birth to their kids from April to July and are, therefore, weaning them during the lumbar paralysis period of July to October. Then too, feed requirements are not increased to meet the needs of animals which may be potentially high milk producers.

Parasitisms.—Preliminary observations reveal high parasite counts in the ovine species. Parasites found on examination were the same as those which ruined many American ranchmen before adequate control measures were instituted. These include:

Strongyloides sp. infection begins in the latter part of February and continues through June.

Coccidium sp. infection begins in early March and continues through July.

Haemonchus contortus infection begins the last of May and continues through January.

Oesophagostomum columbianum infection begins the last of June and continues through January.

Moniezia sp. infection begins during the last of August and continues through April.

Trichostrongylus sp. infection begins in May and continues through November.

Bunostomum sp. infection begins in August and continues through November.

The first three parasites mentioned tend to make the animals anemic and weak. Oesophagostomum sp. produce nodular formations along the intestinal tract and interfere with digestion and absorption when the condition is extensive, while Moniezia sp. cause moderate to severe debility, depending upon the degree of infection. Sarcosporidiosis was not studied during this research.

Mineral Metabolism Disturbances and Avitaminoses.—Even when soil and weather conditions are favorable, a deficiency of calcium and phosphorus in the body may be brought about by prolonged feeding with materials naturally poor in calcium and phosphorus such as turnips, potatoes (tubers and roots), corn, leguminous seeds, and preparations of these such as potato peelings, straw, vegetable peelings, tops, whey, and similar feeds. In Japanese agrarian areas, the above feeds make up the principal diet. This factor may play a part, in combination with unsuitable soil conditions* and prolonged drought since, in such circumstances, the lack of natural foodstuffs necessitates the use of the foodstuffs mentioned.

When the diet is poor in calcium or phosphorus, transfer of phosphorus or calcium from the bones to the blood increases for the purpose of maintaining salt equilibrium in the plasma. This is due partly to the regulatory action of the parathyroid glands. Thus, calcium is withdrawn from the bones and that absorbed from the intestines is

*The soil in agrarian areas of Japan is acid.

largely retained in the blood instead of being deposited in the skeleton. The fall in the phosphorus content of the plasma, as seen in these experiments, results in a condition of subsaturation, presumably with subsequent transfer of phosphorus from the bones to the blood, and retention of much of that derived from the food which would otherwise be deposited in the bones.

TABLE 2—National Livestock Breeding Farms (9 Stations)—1949

		Sheep	Goats
Number of animals		862	436
Number of cases		14	25
Number of deaths		3	6
Percentage:	Cases	1.6%	5.7%
	Deaths	0.3%	1.3%

Moreover, rickety or osteomalacial changes may be accompanied by changes in the bone marrow which may interfere with hematopoiesis. Laboratory investigations revealed mitoses of the red cells, many juvenile cells, and also a mild leukocytosis which may be relative or absolute.

Except for carnivores, a much more common cause of rickets is a relative insufficiency of calcium or phosphorus due to an inadequate balance between earthy bases and phosphoric acid or, in other words, the acid-base ratio in the diet. Thus, the value

$$\text{E.A.} = (\text{Ca}) + (\text{MgO}) + \text{P}_2\text{O}_5$$

(where E.A. = earthy alkalinity)

may be markedly shifted either in the negative or in the positive direction, and in herbivores rickets or osteomalacia may develop in either case.

TABLE 3—Prefectural Livestock Breeding Farms (64 Stations)—1949

		Sheep	Goats
Number of Animals		2,389	553
Number of Cases		65	53
Number of Deaths		25	25
Percentage:	Cases	2.7%	9.5%
	Deaths	1.0%	4.5%

Foodstuffs with a negative E.A. value include all kinds of corn and seeds and artificial preparations or by-products of these (meal, bran, malt, barm), oil cake, and meat meal. Other factors involved also include: A relative insufficiency of calcium and phosphorus develops when the diet contains adequate quantities but has a negative or too low a positive alkali-akalinity value ($Na_2O - K_2O$) — ($Cl - SO_3$). In such cases, large quantities of calcium base are diverted to the purpose of neutralizing the excess of phosphoric or other noncombustible acids.

In herbivorous animals, an excess of oxalic acid or any other organic acid may cause rickets or osteomalacia. These are, of course, excreted as calcium salts (calcium phosphate).

Vitamin A and D deficiency symptoms also are seen.

Paralysis.—Cases of paralysis investigated and observed indicate that this was not a true paralysis of the posterior extremities. Actually, it was a weakening of the hindquarters so that the animal went down. Involvement of the hindquarters, which was the rule, caused shortening of the stride, lameness, and stiffness. Hind legs sometimes were directed forward under the body and, in some cases, the tarsal joints developed a permanent flexion.

Atrophy or muscular trophoneurosis of the gluteal, gastrocnemius, semitendinosis, semimembranosis, vastus laterlis, and rectus femoris muscles was seen.

Pinching and probing of the hind legs resulted in drawing the legs up, indicating that conditioned motor reflexes were unimpaired. In some cases, there was increased tonicity of the muscles. Convulsive symptoms or tetany were seen in the late stages accompanied by nystagmus. Bending and bowing of the legs was seen.

Enlargement of the carpal joints and beading along the ribs were seen in some cases. Creepiness of the front legs and stiffness resembling articular rheumatism occurred. Falling hair, dullness of coat, unthriftiness, and marked anemia were also observed, depending upon the severity of the case.

Defecation and urination were normal in all cases observed. The majority of cases occurred in the female.

Incidence of Lumbar Paralysis.—An analysis of the incidence of lumbar paralysis on national and prefectural livestock breeding farms and Japanese farms, based on reports of the Ministry of Agriculture and Forestry Animal Hygiene Section, are shown in tables 2, 3, and 4.

*Analysis of Agriculture Insurance and Animal Hygiene Sections.**—From 1945 to 1949, there were no reports from the insurance section on sheep and goats; therefore, the Animal Hygiene Section reports of lumbar paralysis for sheep and goats during this period are not included (table 5).

TABLE 4—Japanese Farms (1949) Random Sampling of 60 Guns in the Nine Districts of Japan

		Sheep	Goats
Number of Animals		32,385	41,557
Number of Cases		1,729	3,704
Number of Deaths		701	665
Percentage:	Cases	5.3%	4.7%
	Deaths	2.1%	1.5%

*These sections are both under the Ministry of Agriculture and Forestry.

The Animal Hygiene Section reports were on examinations carried out on 91,681 horses. The incidence of osteomalacia* was reported to be 17.7 per cent. In areas where the incidence of osteomalacia in horses was high, the geographic distribution of lumbar paralysis in sheep and goats was significantly high. These areas are: Hokkaido, Gumma, Miyagi, Yamagata, Tochigi, Saga, Nagano, Saitama, Gifu, Akita, and Ishikawa.

TABLE 5—Report on Lumbar Paralysis

		Animals for which insurance paid on lumbar paralysis (No.)	Lumbar paralysis based on total number insured (%)	Total insurance paid on all diseases	Total animals insured
1945:	Cattle	412	0.03	9,888	1,065,616
	Horses	634	0.16	9,751	386,549
1946:	Cattle	195	0.03	6,228	592,083
	Horses	288	0.08	6,345	353,833
1947:	Cattle	73	0.014	3,645	510,155
	Horses	118	0.06	3,363	179,608
1948:	Cattle	21	0.012	1,259	172,501
	Horses	41	0.073	1,193	56,192
1949:	Cattle	609	0.17	6,354	347,085
	Horses	107	0.012	6,326	852,970
	Goats	255	2.7	1,290	9,300
	Sheep	645	2.4	2,550	26,599
	Swine	3	0.047	837	6,266

This should not be misconstrued to mean that all cases came from these areas. Sporadic cases of an epizoötic or enzoötic nature occur all over Japan. Goats and sheep are not the only animals affected with so-called "lumbar paralysis." Osteomalacia is known and recognized in the equine and bovine species but little attention is given to it in the ovine species.

When it was realized that a nutritional complex might be involved, it was decided to set up the following experiments in an attempt to arrive at a definite conclusion as to the cause of lumbar paralysis. The parasite experiments were carried out at the Chino Livestock Breeding Farm. Chemotherapeutic studies were carried out over a wide area with the coöperation and aid of veterinary private practitioners and mutual aid clinics.

Research Project.—Research projects included mosquito (*Aedes togoi*) breeding and feeding studies; mosquito (*Setaria digitata*) transfer of infective microfilaria from the bovine to the ovine** species; studies of direct microfilarinemia transfer; and staining and diagnosis of microfilaria. Results of studies on blood chemistry, fecal samples, chemotherapeutic studies of antimonials, arsenicals, calcium, phosphorus, magnesium, and dextrose were recorded. Feed analysis, histopathologic studies on the bone, brain and cord inoculation cultures of listeriosis, streptococci, and viruses were also included in the project.

The animals, purchased from nearby farms at Chino Village, Nagano Prefecture, were mostly weanlings. Many had haemonchosis, and all were in poor condition. Preliminary clinical observations and laboratory findings showed undernourishment, heavy internal parasitism, and marked anemia. Optimum feed requirements were not available and substitutes were used to maintain nutritional standards. After two months, the animals still had low red blood cell counts and hemoglobin readings.

RESULTS

Aedes togoi mosquitoes were successfully bred in numbers and used in the feeding and transfer studies. The results of the experiments were negative in that *S. digitata* did not produce lumbar paralysis when side factors present in past studies were eliminated.

Blood studies revealed anemia in all animals tested; many juvenile cells, and a slight leukocytosis was evident.

Blood chemistry studies to determine serum calcium and serum phosphorus were conducted on 314 sheep and goats in the Kanto area. Of the 314 samples, 205 proved to be satisfactory; 109 were either broken or hemolyzed. Of the 205 samples analyzed, 143 revealed subnormal or low serum phosphorus levels in the range of 2+ to 5+ mg./per 100 cc. of serum. Thus, 69 per cent of the animals definitely had low serum phosphorus levels. Serum phosphorus ranges were 2.3 to 14.7 mg./per 100 cc. of serum, while serum calcium levels ranged from 8.4 to 13.3 mg./per 100 cc. of serum. Concentration of blood serum phosphorus is low or below normal while the rachitic process is advancing.

Moreover, of the 314 cases from which samples were taken, 244 were under surveillance and valuable information was collected.

Among the goats and sheep under observation, 181 (74%) females and 63 (26%) males had lumbar paralysis. Among the goats, 141 (92%) were females and 11 (7%) were males. For sheep, the number of females was 40 (43%) and the males 52 (47%). When these figures were broken down into age groups, it was found that 53 per cent were in the 2- and 3-year-old bracket. The total number of cases within this age group was 131. There were more severe cases among goats than sheep.

Chemotherapeutic studies using antimo-

*The term osteomalacia as used in this paper is in the broad sense of the word to include bone abnormalities and/or nutritional paresis.

**Three hundred infective microfilaria were dissected from A. togoi and inoculated subcutaneously into each of the 30 goats.

nials and arsenicals did not affect the course of the *S. digitata* infections, and all experiments connected with this parasite were negative. Calcium, phosphorus, and magnesium therapy proved of value in more than 100 treatments. Tetany and nystagmus were eliminated almost immediately following this treatment. Many of these cases, if caught early, responded in fifteen to twenty minutes, and the animals would rise and begin to eat.

Feed studies are long range projects but when optimum or better and more desirable types of food were given the animals, lumbar paralysis did not develop. However, the anemic conditions did not improve during the two-month observation period.

Brain and cord inoculations from macerated brains and cords of lumbar paralysis cases proved negative *in vivo* in four different species of animals. *In vitro* studies for bacteria (Listeria and Streptococcus) likewise were negative. Viruses could not be isolated from brain and cord material in *in vivo* studies on four different species of animals. Inoculation into embryonated eggs was not done.

DIAGNOSIS

Based on the symptoms and laboratory and research findings, a diagnosis of phosphorus deficiency was made whereby the animals showed osteomalacial symptoms. However, it is believed that a nutritional deficiency complex and avitaminosis exist and this would be better terminology, as other essential elements may also be absent. When such a high percentage (69%) of the animals had low serum phosphorus levels, it is believed that the findings are quite definite. Moreover, feeding and handling methods support the diagnosis. Then too, the disease usually occurs after pregnancy and parturition, when the goats are at a high level of lactation.

The results obtained here are the same that Klobouk, Pribyl, Schermer, Hofferber, Krable, Bongarts, and Rudofsky found in their experiments.

Osteomalacia (nutritional paresis) is predominately a disease of herbivorus animals and occurs in areas where soil conditions are unsuitable and after dry years, but it is also seen in other circumstances often assuming an enzoötic or epizoötic character which may cause one to suspect that the etiologic agent is of an infective nature. This has been noted in districts of Belgium, Germany, France, Austria, Hungary, and in parts of Asia, Africa, North America, and Australia.

Enzoötic outbreaks of osteomalacia in flocks of sheep and goats have been noted as early as ten weeks after they were transferred to pastures, especially in areas where the soil is poor in calcium or phosphorus and the upper strata is composed of gneiss, granite, quartz, or is boggy or peaty and volcanic.

Differences in susceptibility of different breeds play a part in the incidence of this disease.

In general, in the areas where many cases of osteomalacia and lumbar paralysis in horses and cattle occur (reported by the Agriculture Insurance Section, Bureau of Agriculture Administration, Ministry of Agriculture and Forestry) there are corresponding cases of lumbar paralysis in the ovine species. Reports of lumbar paralysis and osteomalacia in horses and cattle for 1945 to 1949, inclusive, were studied. Records on sheep and goats were surveyed for 1949. The area relationship where the greatest number of osteomalacia and posterior paralysis cases were reported in horses and cattle corresponds to the areas where the greatest number of lumbar paralysis cases of the ovine species is reported. Although the disease is prevalent in the equine, bovine, and ovine species all over Japan, certain areas appear to have more cases than others.

The incidence of lumbar paralysis reported for the bovine, ovine, and equine species by the Animal Hygiene Section of the Ministry of Agriculture and Forestry is high for all three species. Lumbar paralysis is a misnomer and the term nutritional paresis should be used.

PROGNOSIS

The prognosis for nutritional paresis is guarded and unfavorable. When the animal remains down for more than five to eight days and when the first attempts to make it rise are unsuccessful, there is little hope of recovery. Moreover, if three successive attempts fail and if after the animal has been induced to rise no improvement follows in three days, there is little chance of recovery.

The death rate in Norway, given by Krabbe, is 8.6 per cent; by Bongarts, in Germany, as 75 to 80 per cent; and Rudofsky, in Moravia, as 16 per cent. Reports from other countries are as variable.

Untreated cases of osteomalacia are usually chronic with a period of several months elapsing between the onset of symptoms and death from exhaustion, or recovery. In cases in which nervous disturbances are present, the cases are more rapidly fatal. Relapses may occur after the disease appears to have become stationary or to have begun to improve. These relapses are often brought about by pregnancy, parturition, and lactation. The disease may remain latent for long periods and then become manifest as a result of some factor of this nature.

It is believed that the reason so many LARA† goats died in Japan is the variability of susceptibility or resistance to attacks of osteomalacia and other contributing causes which have been mentioned. Parasitology and proper feeding play no small part in a foodstuffs-hungry country such as Japan.

SUMMARY

The above experiments were carried out at the request of GHQ, SCAP, FEC, Public Health and Welfare Section. Reports from the Japanese channels indicated that lumbar paralysis, as the malady is called by Japanese veterinarians, was threatening the wool, meat, and milk supplies from the ovine species, and could possibly interfere with the expansion of this industry. A time element of two months was set in which to work on the problem. For many years, this malady had been attributed to the microfilaria of *Setaria digitata*, as it was believed that the parasite showed specificity for brain and cord tissue. The original claim that *S. digitata* caused paralysis by damaging the brain or cord had come from Japanese workers in Korea about twelve years ago. This was then taught in the colleges, so that the majority of veterinarians graduating after this period held this belief despite the fact that the results could never be reproduced in Japan. The main purpose of these experiments was to determine if paralysis could be produced by this parasite.

All researches with *S. digitata* were negative, in that it was impossible to produce lumbar paralysis. Thirty goats were inoculated with infective microfilaria from *Aedes togoi*. The filaria died in the body of the ovine species at the end of a month as the parasite showed species specificity. During its wanderings throughout the tissues, the parasite sometimes blundered into the eye or nervous tissue, but there appeared to be no affinity of this parasite to nerve tissue.

In some cases, there was a general resemblance of this disease in its entirety to that of scrapie (English), la tremblante (French), or traberkrankheit or grubberksankheit (German). However, a constant symptom noted in traberkrankheit or scrapie is intense itching or pruritis over the sacral, lumbar, or gluteal regions, and the animal gnaws itself until the area is denuded of hair. Moreover, the age groups in which the disease attacks is usually over 1½ years. The marked anemic condition, time of year when cases occur, excessive inbreeding, pampering (keeping the animals stabled), and poor feed, which are believed to be the cause of scrapie, are also seen in Japan. However, the causative agent of scrapie has never been determined, although the above mentioned factors, and extensive inbreeding, are believed to be the primary causes.

The anemic condition seen in weanling goats and sheep or any weanling animal is understandable. However, in the older age groups, the anemia persisted even though the adults were wormed — using phenothiazine on one group and copper sulfate and nicotine solution on the other. This anemia continued throughout the two months of observation.

Time did not allow for breeding studies or genetic work, as these are long-range projects.

The anemia seen in adults could be the result of osteomalacia (active demineralization) and damage to the bone marrow tissue. Also, cobalt deficiency could play a part. A study of this is underway at the present time.††

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2-Amino-5-Nitrothiazole in the Control of Enterohepatitis (Blackhead) in Turkeys

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Preliminary experiments reported by Waletsky, Brandt, Bliznick, and Hughes[1] and McGregor[2] demonstrated the prophylactic value of 2-amino-5-nitrothiazole* (ANT).

To augment the existing knowledge concerning the use of ANT, a subsequent experiment was made to ascertain if this drug, used at a preventive level, accumulates sufficiently in the bodies of birds to protect them against blackhead after treatment has been discontinued.

Methods and Materials.—In this experiment, 210 poults 13 weeks old were utilized. These birds were survivors of a previous test involving enterohepatitis, to which infection they had been fully exposed. They were birds which had manifested some, but not severe, symptoms of the disease. These birds were all that were immediately available for testing. To compensate for this situation, the birds were randomized to secure, as far as possible, uniform conditions in each experimental group.

The experimental birds were separated into four groups, one of which was used as a control, the other three were treated with ANT in 0.05 per cent concentration in the feed for the times indicated in table 1.

The experimental birds were exposed to natural infection on ground previously ranged by turkeys suffering from enterohepatitis. The test birds were exposed to further infection, for fifty-four days, by contamination of the drinking water with Heterakis eggs embryonated in *Gallus domesticus* feces and earth.

TABLE 1

Trial lot	Turkeys in each lot (No.)	No. of days 0.05% ANT administered	Birds dead from blackhead during medication	Birds dead from blackhead 38 days after medication was discontinued	Total birds dead from blackhead during experiment
A*	53	Nil	—	—	41 (77.35%)
B	52	14	1 (1.92%)	31 (59.61%)	33 (63.46%)
C	53	28	2 (3.77%)	14 (26.41%)	19 (35.84%)
D	52	42	2 (3.84%)	11 (21.15%)	13 (25.0 %)

*Controls.

The experiment was terminated on the eightieth day, since that was considered sufficient time in which to ascertain if ANT was accumulated in the body.

For thirty-eight days following the last day on which medication was given to the birds in trial lots B, C, and D, a count of deaths due to blackhead was kept. This period was considered sufficient time to allow for fluctuations in the incidence of any blackhead that might occur after the administration of ANT was discontinued.

RESULTS

Table 1 and figure 1 summarize, in part, the results of the investigation.

Besides the observations made to satisfy the main purpose of this experiment, additional information was obtained concerning the action of ANT in controlling enterohepatitis:

1) ANT administered at a 0.05 per cent concentration in the feed gave a minimum of 96.16 per cent protection to birds exposed to an abundance of infective material. This confirmed previous experiments, undertaken by McGregor,[2] which indicated the value of prophylactic treatments.

2) Deaths from clinical blackhead occurred eleven to sixteen days after ANT

*Enheptin (Lederle).

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For valued advice and support in this work by Drs. A. L. MacNabb, A. A. Kingscote, and J. S. Glover, of the Ontario Veterinary College, grateful thanks are tendered.

was withdrawn from the experimental groups of birds.

3) The longer ANT was given in the ration, the fewer clinical cases of enterohepatitis occurred after the drug was withdrawn (see fig. 1).

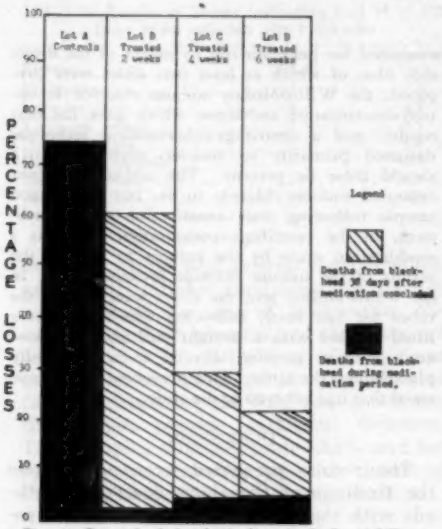

Fig. 1—Record of deaths in lots A, B, C, and D.

4) Although the control birds used in this experiment had survived previous exposure to blackhead, they did not show any appreciable immunity, since the percentage that died of enterohepatitis in the trial lot A was 77.35 per cent.

DISCUSSION

ANT did not give protection to birds exposed to blackhead infection beyond the period in which the drug was actually administered in the feed. This significant observation is supported by the fact that birds died from blackhead eleven to sixteen days after medication was withdrawn — a time lapse closely corresponding to the prepatent period in a natural blackhead outbreak.

The graduated drop in blackhead incidence and mortality shown in figure 1 in each of the successive lots of birds A to D might be explained by such possibilities as an age-conferred refractoriness to blackhead, or a slowly developing immune response to infective material during the continued exposure to infection.

SUMMARY

In this experiment, 13-week-old poults, survivors of a severe outbreak of blackhead, were reëxposed to enterohepatitis infection and given ANT at 0.05 per cent concentration in the feed for graduated periods.

ANT in the 0.05 per cent concentration in the feed possessed prophylactic action against blackhead only while it was administered continually in the feed. There was no indication that the drug was stored in the tissues of treated birds for any appreciable time after medication was withdrawn. The number of clinical cases of blackhead declined, however, in inverse ratio to the time that ANT was administered, but deaths occurred to a degree even in birds approaching market age after treatment was discontinued.

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Clinical Aids Panel in "Proceedings Book"

Dr. Francis T. Candlin presented a clinical aids film at the AVMA annual meeting at Miami Beach (August, 1950) with running comments on a tape recorder synchronized with a film. In the "Proceedings Book", Dr. Candlin is introduced by Dr. Bild, the chairman, but as he did not submit a paper for publication, the only reference made to it is the note in parenthesis on p. 230 to that effect. Unfortunately, no transcript was made of Dr. Candlin's talk by the AVMA reporter, as she understood his paper had been submitted previously.

Q Fever in Cows.—Of 60,000 dairy cattle shipped into the Los Angeles area annually, 40 to 50 per cent acquire asymptomatic infection with *Coxiella burnetii* within six months. Experiments with aureomycin offered no hope that spread of the disease to man could be stopped by therapeutic control in cattle.—*Pub. Health Rep., Feb. 16, 1951.*

Fecal Examination of 200 Dogs from Salt Lake City, for Intestinal Helminths

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Salt Lake City, Utah

THIS INVESTIGATION was undertaken in an attempt to determine the kinds and numbers of intestinal helminths present in a random sample of 200 dogs from the Salt Lake City area. As far as could be determined through local inquiry and survey of literature, no such investigation had previously been attempted in this region. The writers' interest in the problem was stimulated by the occurrence in the region of a number of human cases of hydatidosis produced by *Echinococcus granulosus* (Batsch) 1786 Rudolphi 1805. Since the adult Echinococcus is considered generally to be a parasite of the canine species, a survey of the local dog population seemed an important aspect of the epidemiologic investigation of these infections. Because some of the human cases were residents of the city, and had few if any rural contacts, a survey of the city dog population seemed a worth-while project.

MATERIALS AND METHODS

The fecal material upon which the results of this study are based was collected from 200 nondescript dogs temporarily housed at the city dog pound during the six months the survey was in progress. Material was also collected from dogs at the kennels of the University of Utah Medical College, but these animals usually came from the city pound originally. The dogs examined, in general, were those collected at random from the city streets by the dog catcher for violation of city ordinances. According to these laws, both licensed and unlicensed dogs may be impounded if allowed to run free on the streets. They are held for a five-day period at the pound and, if not claimed by their owners, are then destroyed or sold to new owners. Since dogs from all parts of the city, as well as from all types of homes, are included, the results of the investigation are considered to be an accurate indication of the helminthic infection that exists.

Fecal samples were collected only from dogs kept in individual cages, and a daily roster was kept to prevent resampling. Fecal samples were placed in individual sputum cups for transportation to the laboratory. Each sample was then examined for helminth ova by means of the direct thin film, of which at least two slides were prepared; the Willis-Molloy sodium chloride levitation-concentration technique, which gave the best results; and a centrifuge-concentration technique designed primarily to recover operculated ova should these be present. The addition of concentrated sodium chloride to the last centrifuged sample following slide examination of the sediment, in the centrifuge-concentration test, was a modification made by the authors to recheck the results of the sodium chloride levitation test. In the Willis-Molloy test, the slides were left on the tubes for one hour, following which they were lifted upward with a straight pull and then lowered, without turning, directly to a cover slip placed upon the table. This prevented loss of material that had adhered to the slide.

From the Department of Invertebrate Zoölogy and Entomology, University of Utah, Salt Lake City.

DISCUSSION

The results presented were based upon the findings of the above described methods with the exception of the Taenia tapeworms. *Taenia pisiformis* was diagnosed once from proglottids recovered in the stool and once from an adult obtained through autopsy. In the other case reported, Taenia ova were recovered from the stool. The owner allowed a dose of vermifuge to be administered which yielded more ova, but no proglottids. Since most of the dogs examined were either household pets or hunting dogs owned by local citizens, it was not possible, except in a few instances, to autopsy animals to confirm a diagnosis. The adult of *E. granulosus* was not recovered during the survey, although special attention was directed toward its recovery.

The ova of the common species of hookworm do not differ sufficiently to provide for accurate species determination and, for this reason, positive results are reported collectively as hookworm infection.

The results of the survey indicated that 44 of the 200 dogs were infected with helminths. No dog was found to have more than one species. Table 1 presents these results.

The lower total infection found to be present in this region during the study,

as compared with studies in other areas, is considered to be due to the method of sampling used, and to local climatic conditions which might influence infection.

Since Salt Lake City has a hot, dry climate in summer, below freezing temperatures in winter, and generally well drained, sandy soil, suitable conditions for the development of the ova of hookworms, the ascarids, and whipworms are obviously not widespread. The sprinkling of lawns and gardens in the city, and the irrigation of farming areas, are the only local conditions that might provide sufficient moisture. This, coupled with adequate shade and hot summer temperatures, probably produces the infections that were found to exist.

TABLE 1—Results of Survey Indicating that 44 of 200 Dogs Were Infected with Helminths

Parasite	Dogs (No.)	Total dogs (%)
Hookworm	22	11.0
Toxocara canis	9	4.5
Toxascaris leonina	7	3.5
Trichuris vulpis	2	1.0
Dipylidium caninum	1	0.5
Taenia pisiformis	2	1.0
Taenia sp.	1	0.5

RESULTS COMPARED TO OTHER LOCALITIES

In an attempt to correlate the results of this investigation with those of other workers, the following material has been taken from the literature and from personal correspondence with workers in other parts of the United States (table 2). Whenever possible, the percentages of infection have been included in the table. When the data given did not permit the use of percentages, they have been reported as common (C), and present (P).

Cross and Allen conducted a survey of the dogs and cats in Chicago for intestinal helminths and Trichina. Their results, as reported by Morgan and Hawkins,[6] give no data as to how the results were obtained. Whitney[10] conducted a study of 1,000 fecal examinations which represented a fairly uniform distribution of cases throughout the central, eastern, and northeastern states. Whitney stated, "The samples examined were, more often than not, from dogs which were thought to be 'ailing,' 'off their feed,' or 'suspected of harboring parasites.'" Wharton[9] conducted a survey of dogs in the Philippine Islands for intestinal helminths. His results might be used as a standard of comparison between tropical and temperate regions, as well as two degrees of sanitation.

From greatly appreciated personal correspondence, considerable data for comparison was obtained. Dr. Ernest Carroll Faust[3] has presented some data on the general conditions of helminth infection in dogs of the New Orleans region, which he has been compiling for twenty-one years. Dr. Norman R. Stoll[8] has enumerated the general conditions of infection of the dogs of the Princeton, N. J., area. Dr. B. G. Chitwood[2] has given information of the general conditions in the northeastern United States.

Koutz,[5] in his "Check List of Parasites of Domestic Animals Reported in Ohio," has included an entire section on the parasites of the dog in that region. Stiles and Baker,[7] in the "Key Catalogue of Parasites Reported from Carnivores," have given available information of the general degree and species infections for the United States. Hall[4] has reported on the common diseases of dogs in the United States, which includes information on common parasites. The work of Cameron, Parnell, and Lyster[1] has been included as an example of conditions in the arctic and subarctic regions of North America.

TABLE 2—A Summary of Survey as Compared to Other Localities

Parasites	Present Survey 1	Cross and Allen 2	Whitney 3	Wharton 4	Faust 5	Stoll 6	Koutz 7	Chitwood Stiles and Baker 8	9	Cameron 10	Hall 11
H'kworm sp.	11.0		17.4	96.0	C	P	P	C	P	P	P
Toxocara canis	4.5	12.0	20.9		C	C	P	C	P	P	P
Toxascaris leonina	3.5	11.0		6.7			P	P	P	P	P
Trichuris vulpis	1.0	20.0	23.5			P		C	P	P	P
Dipylidium caninum	0.5	39.0	11.2	46.6		C	P	C	P	P	P
Taenia pisiformis	1.0	10.0				P	P	P	P	P	
Taenia sp.	0.5										

SUMMARY AND CONCLUSIONS

During 1948 and 1949, 200 dogs selected at random from Salt Lake City were examined for the presence of intestinal helminths. Interest was stimulated in the project by the occurrence, in the Salt Lake City area, of human cases of the hydatidosis caused by the larval stage of *Echinococcus granulosus*. Attempts were made to treat dogs with vermifuge, or to autopsy them, to confirm species determinations.

Fecal material obtained from each of the dogs was examined by means of the direct thin film, the centrifuge-concentration method, and the Willis-Molloy sodium chloride levitation technique. The latter method produced the best results in all positive cases.

Results of the survey indicated that 22 per cent of the dogs examined contained at least one species of helminth, with the hookworm species of the dog making up 50 per cent of the positives. No animal was found to contain more than one species. *E. granulosus* was not recovered during the survey although special attention was directed toward its recovery.

A tabulation of similar surveys made in recent years is included for purposes of comparison. The lower percentage of infection found in the Salt Lake City region is considered to be due to the method of sampling employed and to local climate conditions. In a number of the studies listed for comparison, the animals were examined in veterinary hospitals or suspected of having a pathologic condition.

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Taxus (Yew) Poisoning of Cattle

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Lexington, Kentucky

The *Taxus cuspidata* (Japanese yew) and the *Taxus baccata* (English yew) are grown extensively in Kentucky around the home for ornamental plantings. These evergreen shrubs have needle-like leaves that are often shaped like a narrow sickle with dark glossy green above and yellow-green on the lower surface. The seeds are borne in a cup-shaped, fleshy, bright red aril, giving the appearance of a red berry.

The wood, bark, leaves, and seeds contain an alkaloid called taxine, which is a heart depressant. Death will result within a short time if a quantity of leaves are eaten.

On Feb. 26, 1951, a Hereford calf, weighing about 500 lb., was presented to this laboratory (Kentucky Agricultural Experiment Station) for diagnosis. On autopsy, the rumen and reticulum were found to contain a large quantity of yew leaves and twigs. The history on this case revealed that the owner was about out of feed and had turned 60 calves into the yard and lane one evening to graze. There were several yew plants in the yard and lane. The next morning, the owner found 11 calves dead and several sick. The sick calves recovered and no further losses occurred after they were taken out of the yard and lane.

On February 27, a cow was presented to this laboratory for diagnosis. The previous day, the owner had pruned several yew plants in the farmyard and had thrown the cuttings over into the cow pasture. The next morning, the owner found 7 dead cows in the pasture. On autopsy, yew leaves and stems were found in the rumen and reticulum.

A heifer was presented to this laboratory for diagnosis on February 28. During the

From the Department of Animal Pathology, Kentucky Agricultural Experiment Station, Lexington.

The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the director.

night, 13 heifers had broken out of the barn lot into the front yard. Next morning, the owner found 3 dead heifers. On autopsy, yew leaves and stems were found in the rumen and reticulum.

No deaths were reported by any of the three owners after the animals had been removed to pastures free of this shrub.

The Relation of Trace Minerals to Brucellosis

Enterprising agencies are promoting the idea that deficiencies of trace mineral elements such as manganese, copper, cobalt, and iodine in feeds are related to, and lead to, brucellosis in cattle.

These claims and notions are contrary to all known scientific data or facts. Such treatment with trace mineral elements is without value in the control of brucellosis in cattle. Unfortunately, there is as yet no drug or nutrient known which will eliminate this disease.—*Kansas Vet. M. A. Bull., Jan., 1951.*

Immunizing Lambs Against Infectious Enterotoxemia

Infectious enterotoxemia of sheep (also known as "pulpy kidney disease" or "milk colic") is acute and highly fatal, resulting, as far as is known at present, from the absorption of the extremely potent toxin of the soil-borne anaërobe *Clostridium welchii* (type D) from the small intestine.

The outbreak can be stopped abruptly in nursing lambs by penning them, with their mothers, for approximately twenty-four hours. They should be released in a different pasture. In feedlot lambs, starving the animals for twenty-four to forty-eight hours will stop the outbreak. Hay may be fed sparingly but all grain should be withheld and the lambs should be returned to full feed gradually and cautiously.

Immunization by injection of a whole culture bacterin (really an anaculture and toxoid) at the beginning of the feeding period is sound practice. Immunization of the nursing lamb at about 1 week of age can be accomplished by the same procedure but is not economically feasible, except in small flocks and in valuable breeding ewes and rams. Immunization of the ewe about the end of the breeding season (October or November), followed by the injection of a "booster" dose at tagging time (about a month before lambing), is being practiced. The antibodies from the mother are passed into the milk and the nursing lamb may be protected through the danger period.—*I. B. Boughton, D.V.M., North Am. Vet., 32, (April, 1951):230.*

Ethyl Alcohol Not for Wounds

Ethyl alcohol, the ordinary alcohol of commerce and pharmacy, should not be used as a disinfectant in wounds or on the raw surface of injured areas. Its antibacterial action is neutralized by proteins in the wound; moreover, it causes pain, harms wound tissues, and delays healing. Seventy per cent alcohol (by weight) in water, however, is still the solution of choice for skin disinfection. Used on healthy skin, it is powerfully destructive to germs and harmless to the body.—*Arch. Surg., Sept., 1950.*

"Can the Vet Save Your Pet?"

Redbook Magazine has advised the AVMA office that an article, entitled "Can the Vet Save Your Pet?", will appear in the June, 1951, issue of that magazine which will be on the newsstands May 25.

Members of the AVMA staff had an opportunity to see an advance print of the article and recommend it as important reading for every veterinarian, whether in small animal practice or not, because it represents one of the few efforts ever made by a leading national magazine to tell unbiased facts about modern veterinary medicine and about the associations that are pacing its rapid progress.

The author is Clive Howard, well known for his popular magazine articles on the medical profession. Mr. Howard told both sides of the story—bad as well as good about the workings of small animal medicine. But he did it constructively and with sincere interest in giving pet owners the best possible guidance.

Veterinarians who read this article carefully will conclude that he has given the profession full credit for its accomplishments. In the words of his article, "An ethical, modern veterinarian can do as much for your pet as the best doctor can do for you."

NUTRITION

Observations on the Relation of Diet to Diarrhea in Young Dairy Calves

W. D. POUNDEN, D.V.M., Ph.D.; J. W. HIBBS, Ph.D.; C. R. COLE, D.V.M., Ph.D.

Wooster, Ohio

THERE IS RATHER general agreement that the ration or its manner of feeding may adversely influence the health of young calves, particularly with reference to the stimulation of attacks of diarrhea. An opportunity was provided for making the following observations regarding the problem during the course of various experiments concerned with raising calves.

EXPERIMENTAL

Jersey and Holstein-Friesian calves were represented in fairly equal numbers in these investigations. All calves received colostrum followed by milk feeding in moderate quantities, the majority at the rate of 1.0 lb. per day per 10 to 12 lb. body weight at birth, with 6 lb. for Jerseys and 10 lb. for Holstein-Friesians being the maximum daily allowances. Milk feeding generally was continued for 6 to 7 weeks of age. However, animals fed calf starter grain rations free choice had their milk ration reduced at an earlier age than is in line with feeding schedules usually recommended for use with these feeds. Several different types of calf starter grain rations were used. The simple grain mixture fed contained 14.5 per cent protein and was composed of corn, oats, bran, soybean oil meal, and salt. For the most part, the hays were of good quality. The occurrence of diarrhea was recorded and note was taken of the severity of the symptoms as shown by depression and inappetance. Observations were made of the intensity of the hyperemia of the intestinal tract in a number of calves. Tissue sections and bacteriologic smears were prepared for microscopic examination from parts of the intestinal tract of some of the latter calves.

A summary is presented in table 1 of the incidence of diarrhea among the calves during the first 6 weeks of age. This period was chosen because the problem in the young calves under study was confined almost entirely to the first 6 weeks of age. The animals are grouped according to the dry feed ration they received. Information is provided on the number of calves fed each type of ration and the number and percentage that were affected with diarrhea. Eighty-two (56.6%) of the calves suffered attacks (table 1). The incidence was highest (87.2%) in those which received alfalfa hay of comparatively good quality along with a calf starter grain ration, both free choice. A smaller proportion (50.0%) was affected among the calves receiving alfalfa hay and the simple grain ration free choice, and somewhat less than this (44.4%) when consumption of the latter grain ration was restricted. There was a striking lack of trouble in calves that received no grain, but only first- or second-cutting alfalfa hay of comparatively good quality which sometimes had a limited quantity of grass hay mixed in it. However, the incidence was high when leafy, green, third-cutting alfalfa hay alone was fed (80.0%), and also free choice feeding of all three hays together—alfalfa, clover, and timothy (77.7%). The clover hay was considered to be principally involved in this case. Twelve other calves that are not included in table 1 had access to lawn pasture alone, or in combination with hay and grain, or both, and 5 of these had mild attacks.

For the most part, the attacks were short and many were sufficiently mild that they would receive little attention in the majority of herds. However, differences which seemed to be associ-

TABLE 1—The Incidence of Diarrhea in Calves up to 6 Weeks of Age when Fed Various Rations

Ration	Calves (No.)	Diarrhea (No.)	Diarrhea (%)
Alfalfa hay + calf starter grain (both free choice)	39	34	87.2
Alfalfa hay + simple grain mixture (both free choice)	18	9	50.0
Alfalfa hay + simple grain mixture (2, 3 or 4 parts hay: 1 part grain)	36	16	44.4
Alfalfa hay (1st and 2nd cutting, some grass hay present sometimes)	24	1	4.2
Alfalfa hay, leafy green 3d cutting	10	8	80.0
Alfalfa, clover, and timothy hays (all free choice)	18	14	77.7
Total	145	82	56.5

From the Ohio Agricultural Experiment Station. Dr. Pounden is now located at the Animal Disease Station, BAI, Beltsville, Md.; and Dr. Cole is chairman, Department of Pathology, College of Veterinary Medicine, The Ohio State University, Columbus.

ated with the rations eaten were noticeable in the symptoms accompanying the diarrhea. Affected animals eating the leafy third-cutting alfalfa hay and those that had access to all three hays—alfalfa, clover, and timothy—appeared to suffer little or no visible discomfort. Their feces usually resembled those of mature stock feeding on rather laxative roughages or pastures. On the other hand, some depression was a common symptom during attacks suffered by animals consuming alfalfa hay along with a calf starter grain mixture. This was manifested by a desire to avoid exercise along with temporary partial, or occasionally complete, loss of appetite. Calves eating this combination of feeds seemed to be particularly susceptible to attacks when the weather became suddenly cold during the winter and spring, at which times it was difficult to avoid drafts and temperature variations in the barns. Perhaps with better housing conditions, such would not have been the case. The feces of these calves often were watery and foul smelling during the attacks. Depression and inappetance were present sometimes in affected animals receiving alfalfa hay and the simple grain mixture, both free choice. But such was not the case when the grain consumption was limited to a quarter of the hay being eaten. The latter was accomplished by grinding the hay and mixing the grain with it.[2]

The results obtained when a commercial calf starter grain ration was fed along with good quality hay to 9 calves, beginning at 6 weeks of age, further indicate that combinations of these feeds had a tendency to produce undesirable conditions. To the ration of alfalfa, clover, and timothy hays fed free choice, calf starter ration was added at the rate of ¼ lb. per day. It was later increased in quantity equal to one-half the hay being consumed. Extremely severe reactions occurred in 3 of these calves even though the other 6 were unaffected. One of the 3, a Jersey calf, became sick on the second day and died on the fifth day. The other 2 were Holstein-Friesians, and 1 of these had to be taken off the ration to save its life. Four similar calves in adjoining pens which received the simple grain mixture instead of the calf starter, were unaffected.

The results of examinations of the intestines of a number of calves that had been fed in various ways are summarized in table 2. They have been placed in groups depending on the type of dry feeds the animals were receiving prior to slaughter. Included are the number and the age of the calves at the time of examination, and the number in which hyperemia or other conditions of the intestines were noted. These calves, for the most part, were older than 6 weeks of age at the time these examinations were made and thus the observations, unfortunately, do not cover the same age period during which most attacks of diarrhea occurred. Even so, the relationship which appears to exist between the conditions noted in their intestines and the feed they were receiving appear to support the evidence that a relationship existed between the rations fed and the incidence of diarrhea in younger calves.

The cecum of a 3-week-old calf having access to alfalfa hay but eating mostly calf starter grain appeared slightly enlarged, and the contents were dark brown, contained small granular particles of

TABLE 2—The Ration and the Condition of the Intestinal Tract of Young Dairy Calves

Ration	Calves examined (No.)	Intestinal hyperemia (No.)	Age (weeks)	Hyperemia	
				small intestine	cecum and colon
Alfalfa hay + calf starter grain					
Both free choice	1	1	3	Moderate all parts.	Mild, both. (Cecum appeared enlarged and contents excessively liquid.)
Hay 2 or more parts: grain 1 part	4	3	10	Mild.	
		1	10	Marked, all.	Mild, both.
Alfalfa + clover + timothy + ¼ lb. starter grain	1	1	7	Marked, illeocecal valve.	Marked, both; petechia (masses of Vibrio).
Total	6	6	3-10		
Alfalfa + clover + timothy					
Both free choice	2	2	6	Moderate, all parts.	(1 cecal contents excessively liquid.)
Hay 2 or more parts: grain 1 part 1st & 2nd cutting hay	9	6	10-14	Mild, jejunum and ileum.	1 mild, cecum.
Bright green 3d cutting hay	3	3	6-12	2 mild post. ileum.	(Contents excessively liquid.)
Total	14	11	6-14		
Alfalfa hay	8	1	3	Slight, jejunum.	
		3	10-13	Slight, jejunum.	
		1	13		Mild, both.
Total	8	5	3-13		

feed, and were of a watery, soupy consistency. A similar semiliquid condition was present in 1 of the calves that had been eating principally the simple grain mixture. The contents of both the cecum and colon of 3 calves receiving bright green, third-cutting hay along with limited quantities of simple grain mixture also appeared to be excessively liquid. However, the contents were green and less watery than those of the calf which ate mostly calf starter grain. The walls of the intestines associated with the rather laxative third-cutting hay grossly were normal in appearance with the mucosa being pale and quite different from the deeper red hue generally seen in the calves which had eaten heavily of grain. The intestines of calves receiving first- or second-cutting alfalfa hay alone were noticeably free of any marked hyperemia or other lesions.

The most seriously affected large intestines were those of the 6-week-old calf mentioned previously, which died a few days after having had calf starter grain added to a ration of alfalfa, timothy, and clover hays. Hyperemia was intense and petechia were numerous. Gram-stained smears showed the presence of masses of Vibrio both in the contents of the cecum of this latter calf and in preparations made from scrapings of the cecal mucosa after it had been washed free of the contents. The significance of the presence of the Vibrio organisms in the cecum of this calf is unknown. The possibility that they were the same as those described by Jones *et al.*[3] was not determined. Organisms of similar morphology were observed in the intestines of another calf which was considered to be healthy when slaughtered. Occasionally, such organisms were visible in considerable numbers in stained slides prepared from rumen samples from calves eating relatively high proportions of grain.

The small intestines of 4 out of 5, 6-week-old calves which are not listed in table 2 and which had access to lawn pasture and other feeds were mildly hyperemic. Five others which were being fed fresh lawn clippings, when slaughtered at between 8 and 10 weeks of age, had from mild to quite marked hyperemia of the small intestines. In both groups, the large intestines were practically free of hyperemic areas.

Microscopic examination of tissue sections made from the hyperemic areas of the intestines of 22 of the calves showed that changes were mild and less than seemed to be indicated by macroscopic inspection. The blood vessels in hyperemic areas were full but extravasation of red blood cells was seldom observed. Massive numbers of eosinophils were visible in subepithelial tissues in many locations and their presence was not confined strictly to hyperemic areas. Goblet cells in a distended condition were sufficiently numerous in some preparations to indicate considerable activity in mucus production but not necessarily pathologic in nature. A limited number of coccidial oöcysts were visible in some sections.

DISCUSSION

The presence of rather liquid contents, yet lack of hyperemia, in the large intestines of calves eating the laxative, green, leafy, third-cutting alfalfa possibly was due to excessive amounts, in the hay, of minerals or substances capable of exerting an osmotic effect. However, adequate proof for such an explanation was not obtained.

Some of the feeding schedules that appeared to stimulate attacks of diarrhea, such as the provision of good quality hay along with calf starter grain mixtures, were in line with usual feeding recommendations. Consequently, it is possible that combinations of these feeds are a cause of ill health among young dairy calves, which are not always recognized as such. Limited experience with a few calves other than those included in the data presented indicated that although attacks were not as prone to occur when calf starter rations were fed alone, this feeding program presents other problems. According to Turk,[4] no calf starter concentrate is completely adequate and all require the support of good quality hay. Then again, when hay was withheld, calves ate the straw or shavings used for bedding. Fiber balls formed from the straw in some calves. In 1 calf on a diet of milk alone, with straw for bedding, one of these was over 3 in. in diameter and it adhered to the rumen wall producing areas of necrobiosis. In another calf having shavings for bedding, the sharp points on the bits of shavings which it ingested pierced the tissues and caused an abscess in the omasal wall.

It is of interest that calves on diets of certain types of good quality roughage alone were least subject to intestinal upsets. It lends credence to the idea that a change to this type of feeding program was at least in part responsible for alleviating the severity of an outbreak of coccidiosis in a small herd.[3] It may also offer a partial answer as to why calves raised in pens out in the open where a certain amount of pasture apparently was available (judging by the photographs accompanying the article) were found by Davis to be more resistant to this disease condition than calves raised in other ways.[5]

SUMMARY

The incidence of diarrhea among 145

calves during their first 6 weeks of age was 56.6 per cent. The incidence was highest (87.2%) among the 39 calves which received alfalfa hay of comparatively good quality along with calf starter grain rations, both free choice. Half the 18 calves which were fed alfalfa hay and a simple grain mixture, both free choice, were affected, as were slightly less than half (44.4%) of the 36 calves which received the hay along with restricted quantities of the grain ration.

There was a striking lack of diarrhea among the 24 calves that received no grain but only first- or second-cutting alfalfa hay. However, the incidence was high among 10 calves which were fed leafy, green, third-cutting alfalfa hay alone (80.0%) and also in the 18 calves which received the 3 hays, alfalfa, clover, and timothy, free choice (77.8%).

Although, for the most part, the attacks were mild and short, a difference frequently was noticeable in the severity of the symptoms exhibited by calves fed in various ways. Affected animals which ate the hays alone appeared to suffer little or no discomfort, but in many of those receiving both grain and hay some depression was present, being manifested by a desire to avoid exercise along with some temporary loss of appetite.

Serious attacks of diarrhea occurred in 3 of 9 calves, when they were 6 weeks old, on addition of a limited quantity of calf starter grain ration to their diet of alfalfa, clover, and timothy hays. Intense hyperemia of the large intestines was present, accompanied by petechia, and masses of Vibrio were present in the contents and in the mucosa of the cecum of 1 which died.

Examination of the intestines of calves ranging in age from 3 to 14 weeks indicated that generally there was less hyperemia in calves eating hay alone than in those consuming grain. Very few lesions or tissue changes were discernible in microscopic preparations of the hyperemic areas in the intestines of 22 calves. Massive numbers of eosinophils were present in subepithelial tissues in many locations in the intestines and their presence was not confined strictly to hyperemic areas.

The possibility is suggested that the laxative effect of certain of the hays in the absence of hyperemia of the intestines was caused by an osmotic reaction brought on by their high content of minerals or substances capable of exerting an osmotic effect.

References

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[4]Turk, K. L.: The Importance of Roughage in Dairy Cattle Feeding. Proc. Ohio Anim. Nutr. Conf., (1948):13-17.

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Thyroprotein Effects in Swine

The effect of thyroid-active substances on the growth rate of hogs has not been fully established. Some investigators have observed a retarded rate of growth. In contrast, others have reported a stimulation of growth rate by feeding thyroprotein to hogs. The results of three feeding trials utilizing a total of 160 Hampshire hogs are reported.

In these trials, the only instances in which the feeding of thyroprotein resulted in an increased growth rate in swine were those in which the level of thyroprotein fed per unit of body weight decreased as the animals grew larger. The feeding of thyroprotein to hogs on pasture in no case stimulated growth rate and, in one instance, significantly depressed the growth rate.—*J. Anim. Sci., Feb., 1951.*

Pyridoxine Deficiency.—Pyridoxine deficiency is characterized in baby pigs by poor appetite, incoördination of muscles, spastic gait, poor growth, epileptic-form fits, comas, rough coat, brown exudate around the eyes, and impairment of eyesight. Experimentally, feeding of pyridoxine cured all the symptoms except the impairment of the eyesight.—*J. Anim. Sci., Feb., 1951.*

The calf and lamb crop is the key to profitable range operations, and balanced nutrition means success in raising calves and lambs, says J. C. Thompson in *Western Livestock Journal* (Sept., 1950, p. 41).

EDITORIAL

Brucellosis Eradication – A Challenge To Be Met

Veterinary medicine stands on the threshold of an accomplishment that could equal or excel the victory over bovine tuberculosis. The challenge to be met is the eradication of brucellosis. At last, the livestock owners of the nation have recognized brucellosis as the threat it is, not only to animal health but also to their own well-being, and are determined to see the job done. Are we, as a profession, as determined to eliminate brucellosis?

The frame of mind which characterizes the cattle and swine industry is readily discernible. The first and most obvious indication is the organization by industry leaders of the National Brucellosis Committee representing approximately 30 producer, industry, scientific, and government organizations. Although this Committee has not made great strides, there is evidence that it is experiencing only the normal amount of growing pains. Suffice it to say that these organizations banded together at the request of the industry for the express purpose of insuring that brucellosis be eradicated.

Several recent farm magazine articles on brucellosis present further strong evidence that an all-out attack against this disease is in the offing (*see Farm Journal*, May, 1951, "We've Got to Whip Brucellosis", and the *Prairie Farmer*, April 21, 1951, "Brucellosis Endangers Your Family!"). The editors of the publications report that these articles are the first in a series on the ravages of brucellosis. More significant is the tone of the articles. The time for talking, compromising, and looking for excuses as to why we aren't eliminating brucellosis is past. The road ahead is clear — an eradication program.

The medical profession has also made up its mind. Physicians can and are diagnosing and treating the disease in their patients, but they agree that the elimination of Brucella infection from domestic animals will solve the complex problem of undulant fever. An editorial, "The Problem of Brucellosis" in the April 14 issue of the *Journal of the American Medical Association* concludes with this statement: "The possibility of total eradication of the disease rests with its elimination in animals."

Who is going to assume the leadership in this great crusade? Veterinarians have the opportunity to take the lead. The livestock producers, physicians, public health workers, and leaders of the dairy and meat industries agree that the role falls naturally on the shoulders of the veterinary profession. Are we going to accept the challenge and lead the way to victory? Or, are we going to continue to bicker about who is going to do the job and about the merits of this, that, and the other plan?

All veterinarians can and do agree on certain fundamentals such as the need for protecting the clean herds, the need for eliminating the infected animals, the necessity of a herd and individual animal diagnosis of the disease, the supplementary value of vaccines, and, finally, the desirability of eradicating brucellosis. Also, every veterinarian knows that plans and programs have to be adapted to areas and herds. There is no *one* plan.

Then what are we waiting for? The coöperation of the herd owners? Perhaps, or are they waiting for us to make up our minds? We have been accused, and with more justification than we like to admit, that we have failed to agree on a procedure and have thereby confused the issue and impeded progress, as was pointed out a year and a half ago in these columns (*see* the JOURNAL Nov., 1949:381.)

The time for quibbling is long past. Now, every practicing veterinarian *must* "get together" with his state authorities; and state and federal disease control agencies *must* iron out their differences and gain the complete support of practicing veterinarians. Improved methods of diagnosis and immunization must be accepted and employed. The work must be concentrated on an area basis with all veterinarians co-

operating in the *educational* work as well as with the routine work of testing and vaccinating. If practicing veterinarians can't or won't do the field work, others will be called on to do it, and, in fact, are already doing it in several places. Nothing should be allowed to interfere with the ultimate goal, brucellosis eradication.

By putting all selfish interests in the background, by placing brucellosis eradication in top priority and thereby leading the march, veterinary medicine can justly lay claim to an achievement that might well overshadow its successful battle against bovine tuberculosis.

Representatives of the AVMA Committee on Practitioner Participation in Brucellosis Control, veterinarians on the brucellosis committee of the U. S. Livestock Sanitary Association, veterinarians from the state and federal disease-control agencies, and public health veterinarians should meet, figuratively lock themselves in a room, and not adjourn until a "platform" for brucellosis eradication which has the endorsement of all segments of our profession has been formulated. Then we will be ready to assume the leadership we are expected to provide.

The JOURNAL urges the AVMA committee to take the initiative in calling a meeting as outlined above or suggest a better, alternate proposal. As representatives of the AVMA, it is logically their responsibility to take the initiative in behalf of the profession and break up the "log-jam."

This, then, is the challenge we face. Will we meet it?

Self-Improvement

What are you doing to improve yourself professionally? How much time do you give each month to keeping abreast of the latest development in animal disease research, new products, and nutritional problems that are being solved?

These questions are asked in an editorial in *The Georgia Veterinarian* (Sept.-Oct., 1950). The editor concludes that at least ten hours a month should be spent on improving one's knowledge of veterinary medicine, because dairymen, livestock men, dog owners, and poultrymen all take farm papers and journals pertaining to their field of endeavor. These papers always print articles concerning diseases and medication, so that the veterinarian who does not spend at least ten hours a month in keeping himself up-to-date will find his clients, who do read consistently, receiving information on animal diseases and animal health before he knows about them.

Lapinized Hog Cholera Vaccine Publicized

An article entitled "Now We Can Eradicate Hog Cholera" which appeared in the May, 1951, issue of *Country Gentleman* describes a new lapinized hog cholera vaccine as the key to the eradication of hog cholera. Veterinarians will be interested in reading the article and no doubt will be asked many questions about the new vaccine. The article by F. J. Keilholtz points out that the vaccine is not as yet commercially available but that "It is now being developed by at least six different firms. If all goes well, it should be in commercial production — perhaps within the next few months."

Importance of Stating Name in Section Meeting Discussions

On page 146 in the "Proceedings Book," Dr. Benjamin D. Blood, chief of the Veterinary Public Health Section, Pan American Sanitary Bureau, WHO, Washington, D. C., is reported as making four remarks in the discussion of the paper on avianized vaccine by Drs. A. L. Stafford and L. E. Starr. Dr. Blood states in a letter to the JOURNAL that he made the first statement only (relative to the study in Iran on vaccination with rabies serum), and that he does not believe he included the last word of that statement, "alone," as shown in the transcript.

The stenotypist's report credits the other three remarks to Dr. Blood, which apparently is erroneous. This incident reemphasizes the importance of each discussant clearly stating his name before commenting in the section meetings.

The veterinarians of the United States stand in a strategic position in food production for the latter half of the twentieth century.—*R. A. Kelser, D.V.M., Pennsylvania.*

CURRENT LITERATURE

ABSTRACTS

Inguinal Hernia in the Dog

Inguinal hernias are rare in male dogs, but 74 cases have been seen in female dogs at the Royal Veterinary College, Stockholm, in seventeen years. Only 2 cases of scrotal hernia have been seen in males. Two cases of incarcerated hernia are described, including the surgical treatment which was successful in both instances.—[*Olsson, Sten-Erik: Two Cases of Incarcerated Inguinal Hernia in Male Dog. Nord. Vet.-med., 2, (1950): 250-254.*]—A.G.K.

Differentiating Living and Dead Sperm Cells

A drop of semen is mixed on a glass slide with two loops of 5 per cent aqueous eosin solution. Four drops of 10 per cent nigrosin solution is added and mixed well. A thin film is made on a second glass slide and dried over a flame. Sperm cells which were living will be unstained while the dead ones will be red. The background is brownish violet.—[*Blom, Erik: A Simple Rapid Method for Differentiating Living and Dead Sperm Cells by Means of Eosin and Nigrosin. Nord. Vet.-med., 2, (1950): 58-61.*]—A.G.K.

Nitrogen Mustard in Lymphadenosis

Five cases of lymphadenosis in adult cattle were treated with nitrogen mustard, using doses of 30 to 40 mg. daily for three or four days.

A dose of 80 mg. once daily was toxic. The observations indicated that there may be a diminution in size of the tumors but the remission is one of relatively short duration. Further work is being done.— [*Norstrom, G.: Experiments with Nitrogen-Mustard Gas in Lymphadenosis in Cattle. Nord. Vet.-med., 2, (1950): 31-41.*]—A.G.K.

Salmonellosis in Chickens

A number of Salmonella species other than *Salmonella gallinarum* and *Salmonella pullorum* were isolated from outbreaks of fatal infections among chickens: *Salmonella choleraesuis* was recovered from 2 mature hens on a farm where it was thought that the rats may have been carriers of the infection, and *Salmonella derby* was found to be the cause of an outbreak among chicks with a 50 per cent mortality (only the chicks that were purchased and brought to the farm were affected). *Salmonella thompson* was demonstrated in an outbreak with 100 per cent mortality. Studies on the farm where the chicks originated revealed infection among the hens. There was also an outbreak of paratyphoid infection on this farm among the people that handled the hens. The infection had been introduced by egg powder. A number of other infections due to other types of Salmonella are described.

It is believed that salmonellosis is most commonly spread by using eggs for hatching from untested flocks. In addition, there is the danger of using kitchen refuse for chicken feed, and the possibility of human carriers as well as rats. It is recommended that routine agglutination tests for Salmonella infections in laying hens include the use of antigens of the B, C, D, and E groups and the O antigens of *Salmonella kentucky* and *Salmonella worthington.*—[*Nordberg, B. K., and Ekstam, M.: Salmonellosis in Chickens. Nord. Vet.-med., 2, (1950): 23-30.*]—A.G.K.

Osteomyelosclerosis in Chickens

The author suggests that osteomyelosclerosis may be a physiologic phenomenon to serve as a store of calcium for subsequent egg formation and not a disease *suo generis.* During 1945, 23.4 per cent of 3,078 hens were found to have the disease, whereas it was seen in only 3.6 per cent of 193 roosters. Studies on normal hens revealed that new formation of bone takes place when follicle maturity is established and ovulation starts. The thesis is further substantiated by the fact that the bony changes frequently are seen when ovulation is at its peak.—[*Sjolte, I. P.: Om Osteomyelosklerose hos Hons (Osteomyelosclerosis in Chickens). Nord. Vet.-med., 2, (1950): 309-334.*]—A.G.K.

Listeriosis in Sheep and Goats

Listeriosis was diagnosed in 19 herds of sheep and three herds of goats. These outbreaks were widely distributed along the western coastal area of Norway. It is believed that the disease is common in other parts of the country and is responsible for many cases of encephalomyelitis which are diagnosed as "staggers." The symptom complex should not be called coenurosis because this does not occur in Norway. Nineteen strains of Listerella were studied and found to be similar, with minor biochemical variations. Culturally, they were distinct from *Erysipelothrix rhusiopathiae.* Three experimental infections in lambs are described. One animal recovered, 1 died of

acute illness, and only 1 developed symptoms of central nervous system involvement. In clinical diagnosis, the diseases coenurosis, louping ill, and scrapie need not be considered because they do not occur in Norway. Milk fever and pregnancy disease may sometimes be excluded because they are associated with pregnancy and occur usually only during the lambing season. Listeriosis must be differentiated from bradsot, pasteurellosis, and other acute infections.—[*Naerland, Gustav: Listeriosis in Sheep and Goats. Contribution to Our Knowledge on its Occurrence in Norway. Nord. Vet.-med., 2, (1950): 1-18.*]—A.G.K.

DDT Poisoning in Animals

Under certain conditions, DDT is toxic for animals and man. There is a wide variation between species and individuals in susceptibility to DDT. Little work has been done on the toxicity for domestic animals of DDT aërosol.

DDT aërosol was used in a barn where a cow was stabled during postpartum. Immediately after exposure to the aërosol, the cow had symptoms of pulmonary edema, salivation, dyspnea, and tachycardia. The animal survived but remained in ill health for two weeks. Ten rabbits, 30 mice, 10 guinea pigs, and 1 horse were exposed to aërosol in a closed room once a day for seven days. The small animals had few symptoms, but the horse developed pulmonary distress and when killed was found to have pulmonary edema. The other animals appeared to develop symptoms later. Three litters of mice born during the exposure failed to live. During the month following exposure, 8 mice, 8 rabbits, and 5 guinea pigs died. It is possible that deaths were due to an infection secondary to the primary lesions caused by DDT. In 3 mice and 1 rabbit, there was loss of hair and thickening of the skin.—[*Westermarck, H.: DDT-Aërosol as a Cause of Poisoning in Animals. Nord. Vet.-med., 2, (1950): 302-308.*]—A.G.K.

Successful Transplantation of a Fertilized Bovine Ovum

This paper reports what the authors believe is the first calf developed from a transplanted bovine embryo and carried to term. The calf weighed 84 lb. and was born alive after 278 days.

The donor was a yearling heifer, one-fourth Shorthorn and three-fourths Holstein-Friesian. The sire was a pure-bred Holstein-Friesian, the recipient a grade Holstein-Friesian yearling heifer.

The donor was slaughtered and the reproductive organs removed. The fertilized ova were washed from the uterine horns. A mid-ventral laparotomy was performed on the recipient heifer. A single, eight-celled ovum was inserted into the lumen of the uterus with a glass micropipette.

The authors believe that this technique, with improvements, may be valuable in the study of certain fertility problems in cows where a question of normality of the ovum vs. normality of genital tract is involved.—[*E. L. Willett, W. G. Black, L. E. Casida, W. H. Stone, P. J. Buckner: Successful Transplantation of a Fertilized Bovine Ovum. Science, 113, (1951): 247.*]

An Aptitude Test for Veterinary Medicine

The author concludes that this new aptitude test for veterinary medicine is a better predictor of the specified criterion than were pre-veterinary grades, singly or collectively, or the American Council on Education test, and that it predicted most efficiently, within the validational group, from a relatively low cutting score.—[*William A. Owens: An Aptitude Test for Veterinary Medicine. J. Applied Psychol., 34, (1950):295-299.*]

Antibiotics in Milk

Antibiotics such as penicillin, aureomycin, and streptomycin, widely used for the treatment of mastitis infections in the udders of producing dairy cows, have been found in the milk from such cows for several milkings after treatment. This has caused difficulty in the manufacture of various types of cheese and buttermilk from such milk.

It is suggested that, at present, the only satisfactory answer to the cheese manufactures' problem of antibiotics in milk is to attempt to get the dairymen to discard no less than three milkings following the treatment of udders.—[*F. J. Doan: Antibiotics in Milk and Discussion of Problems Encountered. Canada Dairy Ice Cream J., 29, (1950): 35-36.*]

The Brucella Abortus Ring Test

During recent years, considerable interest has been shown in the ring test for the diagnosis of brucellosis. In addition to studies on samples of milk from dairy milk cans, this article emphasizes the results of detailed studies of individual cows. It includes data on nonspecific reactions due to the colostrum and to drying-off secretions. It also discusses the technique of conducting ring tests, including preservation of milk samples.

The prevention of souring and the maintenance of milk in a condition suitable for testing by the ring method was maintained for thirteen, eighteen, and twenty-two days respectively by merthiolate 1:1,000, sodium azide 1:1,500, and bichloride of mercury 1:1,000.

Nonspecific reactions occurred subsequent to normal calving, in some instances up to ten to fourteen days after parturition, and in some instances when the volume of milk, in the drying-off period, had decreased to 10 lb. or less per day.

Of 22 lactating cows recently infected, 3 (13.6%) reacted to the ring test first, 8 (36.4%) reacted to the serum-agglutination test first, and 11 (50.0%) reacted simultaneously to both tests.

The milk of 6 other cows failed to react although the serum titers of each was 1:160 or higher.—[*Thomas Moore: The Brucella Ring Test. Canad. J. Comp. Med. Vet. Sci., 15, (1951): 39-47.*]

Further Studies on Leptospirosis

Leptospira canicola, Leptospira icterohemorrhagiae, Leptospira grippotyphosa, and *Leptospira sejrö* were found to be causing the infection in 47 dogs suffering from leptospirosis. The main transmitters of *L. grippotyphosa* and *L. sejrö* were mice. The ration between *L. canicola* infection and other Leptospira strains was 27:20.

A high agglutination titer on *L. icterohemorrhagiae* was found in pigs and horses.

In 2 cases of an acute periodic ophthalmia in horses, high titers of *L. grippotyphosa* and *L. canicola* were found.—[*J. Schermer: Further Studies of Leptospirosis. Monatsh. f. Tiermed., 1, (1951): 1.*]—F. KRAL.

Amputation of Phalanx in a Horse

A complete compound fracture of the first phalanx of a 3½-year-old Thoroughbred mare is described. The first phalanx was disarticulated and amputated and, at the same time, a volar-neurectomy was performed.

After the operation, the mare was given 50 cc. of prontosil soluble (5%) intravenously. Five days after the operation, the animal placed its full weight on the limb. After seven weeks, the healing was complete and a special brace was applied. The horse was able to walk and to serve as a brood mare.—[*H. Scheibitz: Amputation of the 1. Phalanx and Placing of an Artificial Foot in a Horse. Monatsh. f. Vet. Med., 4, (1951): 68.*]—F. KRAL.

BOOKS AND REPORTS

Horse Husbandry

This book contains a wealth of information for the veterinarian who is called upon to answer questions about horses, not only light or draft horses, but mules, ponies, Thoroughbreds, and all of the breeds. There is a lot of good reference material in this book. The variety of subject matter covered has a great deal of breadth, and it is condensed and concise enough to be a handy reference. At the same time, there is considerable specific information about various breeds and other subjects discussed.

Beginning with a short review of the history and development of the horse and the mule, the author traces that history through the ages, discussing certain adaptations and the distribution of horses and mules due to our economic and social trends. Several chapters are devoted to the types and classes of the light horses and, also, work horses and mules, as well as the breeds of both. Other chapters discuss judging and selecting horses, how to determine the age and height, a discussion of stable vices, the action and gaits of horses, and the breeding and feeding problems, including the buildings and equipment needed.

As usual in a book of this type, there is a chapter devoted to horse and mule health, disease prevention, and parasite control. The author points out that, even though several competent veterinarians have reviewed the material included in this chapter, it does not necessarily follow that the material has their full approval and complete agreement. There is a discussion of some of the major parasite problems, and the manner of presentation can hardly by considered objectionable by a veterinarian. As pointed out in one of the early paragraphs of the chapter, the author says, "Every good horseman knows that keeping animals healthy is a major responsibility. It is intended that this information should enhance the services of the veterinarian; for the horseman can do a better job in controlling animal diseases if he has enlightened information at his disposal. Perhaps it is also a fair statement of fact to add that superstition, myth, and secret formulae are used more extensively in treating the diseases of horses and mules than in treating diseases of any other class of livestock."

In an appendix, there is information pertaining to the weight, pounds of dry measures of food, gestation table, sales records, a list of the major breed associations, state agricultural experimental stations, and horse publications.

The reviewer intends for this review to indicate the breadth of the material presented in this book. For the veterinarian who is asked questions about horses and mules, which he sometimes finds difficult to answer, this book is recommended. With very little effort and a minimum of study a wealth of information about our equine friends can be found in this book.—[*Horse Husbandry. By M. E. Ensminger. Cloth. Illustrated. 336 pages. The Interstate Printers and Publishers, Danville, Ill. Price not given.*]

Know Your Teeth

A reliable source book of information about the teeth and dental hygiene has just been published by a Navy dentist. Using a simple question and answer form, the author has incorporated all the information the average patient wants to know about the teeth and the mouth. Material was selected on the basis of repeated queries from patients during fourteen years of dental practice.

Among the subjects discussed are toothpastes, tooth decay, abscessed teeth, dental fillings, vitamins, proper foods, and general body health. The book also discusses the fluorides, ammoniated dentifrices, and other recent discoveries in the field, and presents a review of the history of the profession.—[*Know Your Teeth. By Walter Neal Gallagher, D.D.S. Cloth. Illustrated. 81 pages. Exposition Press, New York 16, N. Y. 1950 Price $2.00.*]

Soil and Fresh Water Nematodes

As indicated in the title, this is a compilation of the nematodes inhabiting soil and fresh water. It is probably the only single treatise which has systematized these nematodes, and it fills a great need in this field. It is not a book primarily designed for the veterinarian, but could be useful as a reference text to the veterinarian who is pursuing graduate courses in the field of parasitology. It is well organized and easily understandable. The illustrations are well located throughout the text, which eliminates the necessity of repeated reference to other parts of the book. References, especially in regard to morphology and bionomics, are given in the text.—[*Soil and Freshwater Nematodes. By T. Goodey. Cloth. Well illustrated. 390 pages. John Wiley & Sons, Inc., New York 16, N. Y. 1951. Price $7.00.*]—R. E. REBRASSIER.

Sterility Following Vibrio Fetus Infection

"Enzoötic sterility" refers to a disease of cattle in the Netherlands characterized by low-grade vaginitis and cervicitis, irregularity of the estrous cycle, and failure to conceive. Cows may develop an immunity and conceive after several failures. The disease is transmitted by infected bulls which may appear to be normal and whose semen is normal. The results of the seven-year investigation reported in this monograph indicate that the enzoötic sterility in the Netherlands is due to *Vibrio fetus.* Infection with this microörganism was found only in cattle that had been bred by bulls reported also to spread enzoötic sterility. Enzoötic sterility was spread by artificial insemination and in one outbreak the abortions were due to *V. fetus.* This microörganism was recovered from the vaginal secretions of 6 of 55 cows suspected of having enzoötic sterility and was occasionally demonstrated in bulls. No *V. fetus* infection could be demonstrated in normal cattle. Specific agglutinin against *V. fetus* was demonstrable in the vaginal mucus of 59 per cent of cows served by bulls with enzoötic sterility, whereas cows bred by normal bulls were entirely negative.—[*Stegenga, Theunis: Vibrio Foetus en enzootische steriliteit. 142 pp. Thesis, University of Utrecht, The Netherlands, 1950.*]—A.G.K.

Stop Snoring

The author operates on the conviction that in the majority of cases snoring is nothing but a bad habit which can be overcome and controlled without drugs, gadgets, or special bedding arrangement by a set of simple mental exercises before retiring at night. He presents a detailed analysis of the physiologic causes for soring, the structure of the respiratory organs, and correct breathing techinques.

Being outside the realm of this JOURNAL no further review is attempted.—[*How to Stop Snoring. By David Horwich. Cloth. 80 pages. Exposition Press, 386 Fourth Avenue, New York 16, N. Y. 1950. Price $2.00.*]

Cancer as I See It

In this book, the author expounds the theory that cancer is due to infection of tissue cells that have been overcome by devitalizing agents. Years of study and research have indicated to the author that the phenomena of pleomorphism of the infective agent, referred to as a "germ virus," explains the diverse manifestations of cancer. Pleomorphism of the infective agent is compared with metamorphosis in the life cycle of insects.

The concepts set forth in this small, easily read book should prove to be of interest to both the laity and medical profession.—[*Cancer as I See It. By Henry W. Abelmann, M.D. Philosophical Library, Inc., New York, N.Y. 1951. Price $2.75.*]—G.W. JENSEN.

REVIEW OF VETERINARY MEDICAL FILMS

Industry for Health.—Sound, 16 mm., black and white; running time about thirty minutes. Produced for the Upjohn Company, Kalamazoo, Mich., by Burton Thomas Films, Inc. Available from the Upjohn Company, Kalamazoo, Mich., without charge.

Those who do not fully understand the complex procedures involved in the discovery, manufacture, production, and handling of drugs and biologic products will have a much better appreciation of the whole process after seeing this film. Divided into sections which describe the various departments of a large biologic manufacturing establishment, emphasis is placed on the need for, and value of, research conducted in libraries and laboratories.

Among the departments described are the department of chemistry and pharmacy, where the quest continually goes on for new products, and the department of bacteriology, which is also engaged in the testing of new products. Pharmacology and endocrinology are other large parts of the total industrial organization. Food and nutrition sections are extremely important, and the film points out that nutritional studies can be just as important as the discovery of new drugs and medicines. The medical department is described, including grants and fellowships allocated, and the control laboratory in the testing and passing of new products. The final stage is the production, where the raw materials are shown being processed into the finished product which the physician, pharmacist, and veterinarian receive in the convenient, carefully packaged, attractive containers.

This film is a good general interest picture. It has no special relationship to veterinary medicine. However, any group interested in knowing about the complexities of the manufacture and production of drugs and biologic products will find the picture of interest. It is extremely well photographed, and interestingly presented.

THE NEWS

Eighty-Eighth Annual Meeting
Milwaukee, Wis.—August 20-23, 1951

Program Will Center on Practitioners' Interests

Section officers are now putting the finishing touches on a scientific program that promises to be the most diversified and interesting ever presented at an AVMA meeting.

Televised demonstrations, announced in the April issue, will give unique scientific diversification to the program, but even without these demonstrations the literary sessions stand on their own in excellence and completeness of coverage.

The July issue of the JOURNAL, the convention number, will give the complete program, but here are a few of the offerings that will more than repay even the longest trip to this convention.

The Section on General Practice, for example, will get latest word on the effects of feeding antibiotic drugs. Brucellosis will be given a thorough going-over from the veterinarian's, as well as the layman's, viewpoint in a panel featuring prominent speakers from all over the nation. Hog cholera immunization, biologic warfare as it pertains to the practitioner, pointers on developing a poultry practice, and new slants on several common disease problems will round out this section's fast-moving program.

The Section on Research may set a precedent by its plan to limit speakers to fifteen minutes, plus five minutes of discussion. The section officers foresee bigger attendance and sharper interest as the result of this move, and they have planned a program that is sure to win compliments. General practitioners and research men alike are awaiting a scheduled report on how bovine hyperkeratosis was induced by feeding a processed concentrate. The link between research and practice

—Milwaukee Journal Photo

The AVMA golf tournament, to be held during the convention in Milwaukee, will be played on Thursday, August 23.

becomes firmer through this section's decision to include three papers on developments in the brucellosis field and a paper on the relation of nutrition to digestive disturbances in swine. In all, there will be 18 papers in this Section.

The Section on Surgery and Obstetrics, preparing for a big role in the telecasts, also will provide plenty of "in person" attractions through panels on reduced fertility in cows, maintenance of fertility in bulls, and aids in dystocia. Hormone therapy and surgical procedures will be pointed to several animal species in papers by well-known veterinarians.

The Section on Small Animals, likewise scheduled for a major contribution to the television program, will devote a considerable part of its time to a symposium on fractures. The group also will hear reports on canine histoplasmosis and other diseases and problems of current importance.

A panel on the role of the public health veterinarian in civilian defense, in the Section on Public Health, will supplement the defense theme of the convention's opening general session. The section officers of this Section have endeavored by the careful selection of speakers and subjects to cement relationships between public health veterinarians, private practitioners, and veterinarians working full time on regulatory work. Other papers are designed to integrate the work of veterinary medicine with other medical sciences and sanitary engineering.

The Section on Poultry, besides contributing to the telecasts, will make a strong bid for increased practitioner participation in poultry disease control — and it has a group of convincing, practical speakers to present its case. A forum on the prevention and control of bacterial diseases and a similar forum on respiratory diseases will share attention with specialized subjects and speakers to give a wide-range view of what is in store for the veterinarian who accepts his responsibilities in this important field.

AVMA Milwaukee Golf Tournament Will Be Held August 23

The convention spotlight will swing from science to golfing within an hour after Dr. John R. Wells is installed as president at the closing session.

A large turnout is predicted for this fourth AVMA golf tournament, which will open at 2 p.m. on August 23 at the Lincoln Hills Country Club in Milwaukee. There will be seven divisions of competition, including divisions for veterinary medical students and exhibitors. Winners will receive prizes at a buffet supper to be held at the country club right after the tournament is over.

The featured event will be the state team championship in which entrants will participate as two-man teams for the top award, the AVMA golf trophy. This division will be open only to AVMA members who also are members of their constituent associations. Each constituent association is entitled to enter one or more teams, with the pairing of members of teams being designated before the tee-off.

Other divisions for which prizes will be awarded will be AVMA members' individual championship, exhibitors' individual championship, students' individual championship, low-ball gross team championship, and individual high-gross score (for booby prize). Plans also call for a blind bogey to be run in conjunction with the tournament and open to all who want to take part.

Entries will be accepted up to tee-off time, but veterinarians planning to take part in the state team championship division are urged to make arrangements through the secretaries of their constituent associations without delay. The AVMA office, in coöperation with the Committee on Local Arrangements, is providing the secretary of each constituent association with entry forms which should be filled out and returned promptly.

Executive Secretary Hardenbergh Appointed Consultant to Rusk Committee

Dr. Howard A. Rusk (M.D.), chairman of the National Advisory Committee to the Selective Service System and the Health Resources Advisory Committee to the National Security Resources Board, has announced that Dr. J. G. Hardenbergh, AVMA executive secretary, has been appointed as a consultant in veterinary medicine to the National Committee. Dr. Rusk pointed out that the appointment was in accord with the wording of the President's proclamation relative to registration under Public Law 779 and with the request of the National Committee that a veterinarian be added to the state advisory committees to Selective Service.

The functions of the veterinary medical consultant will be to attend meetings of the Committee whenever advice concerning doctors of veterinary medicine is desired.

The Committee is comprised of six physicians, one dentist, and one nurse (*see* JOURNAL, Dec., 1950, p. 484, for names of members). Dr. Alan Gregg (M.D.) was appointed to the Committee as a representative of research after the original announcement appeared in the JOURNAL.

Turkish Veterinarians Studying in the United States

Five Turkish veterinarians (Ahsen Adaoglu, Mustafa Durusoy, Ali Kemal Bolat, Cemalettin Omurtag, and Ismail Hakki Atun) are now in the United States studying ways to help the farmers of their country increase returns from one of that country's promising sources of income and at the same time produce more livestock and livestock products. Their study in this country is part of the Technical Assistance Program of the Economic Coöperation Administration. One member of the team is concentrating on new developments in artificial

insemination. Turkey's state farms, which produce breeding stock for farmers, are making extensive use of this method of extending the influence of high quality sires more quickly and widely among the country's herds and flocks and to increase milk production. Many of Turkey's all-purpose cattle give only a pint or so of milk a day.

Other team members will study control of livestock diseases, meat inspection, regulations pertaining to the meat industry, and related problems.

Dr. Krill First Civilian Air Force Veterinary Consultant

Dr. Walter R. Krill, dean of the College of Veterinary Medicine, Ohio State University, is the first civilian veterinary consultant to Major General Harry G. Armstrong, Surgeon of the United States Air Force. On March 23, he visited Wright-Patterson Air Force Base, Dayton, Ohio, for orientation purposes in connection with Air Force Veterinary Service activities at

Left to right—Brig. Gen. Otis B. Schreuder, air surgeon, headquarters Air Matériel Command; Lt. Col. Charles E. Robinson, professor of military science and tactics, veterinary ROTC unit, Ohio State University; Dr. Krill; and Major Neil G. MacEachern, command veterinarian, headquarters Air Matériel Command.

Headquarters Air Matériel Command at the base, and the Aero-Medical Laboratory in Dayton, Ohio.

AVMA Research Fellows

Andrew S. Greig was born in Toronto, Ontario, in 1922, and received his early education in Toronto public and high schools. His first employment was in Connaught Laboratories, and later at the Banting Institute for Medical Research, in the Department of Physiological Hygiene, in Toronto. In 1942, he joined the Canadian Army and served as a technician in the laboratory conducting research on rinderpest on Grosse Isle, P.Q. In 1946, after discharge from the Army, he entered Ontario Veterinary College and received his D.V.M. degree in 1950.

Dr. Andrew S. Greig

PLAN OF THE PROJECT

Dr. Greig's chief interest lies in the field of virology. He has enrolled in the graduate School of Cornell University as a candidate for the Ph.D. degree, majoring in bacteriology. He will concentrate on the study of viruses at the Laboratory for Animal Virus Research, under Dr. J. A. Baker. His thesis evolves around the transmission of viruses by endoparasites, following the work of Dr. R. E. Shope on swine influenza, and Dr. J. T. Syverton on lymphocytic choriomeningitis. At present, he is investigating the possibility of the transmission of the virus of infectious canine hepatitis by the common ascarid of the dog, *Toxocara canis*. Later, he hopes to investigate the possible transmission of other virus diseases by endoparasites.

Volunteers Needed for National Dog Week

A call for volunteers to serve on local committees being organized in various communities in preparation for this year's observance of National Dog Week (Sept. 23-29) has been issued by Mr. R. J. Hanfield, executive secretary, 114 East 32nd St., New York City. Ezio Pinza, opera, stage, and radio star, is the national chairman of the movement this year. Those who can not actively assume work on local committees are urged to submit the names of other qualified persons.

Proposed Amendments to Constitution and Administrative By-Laws

The following amendments which were presented at the 1950 annual meeting of the House of Representatives (*see* "Proceedings Book," 1950: 356, 376) will be submitted to the House for final action at the annual meeting in Milwaukee, Wis., Aug. 18, 1951. They are published again for the information of the membership and in accordance with Section 3, Article IX of the Constitution so that final action can be taken this year.

Amendments Presented in 1950

AMENDMENT NO. 1

To re-define General Membership, present paragraph (b) of Article III, Constitution, is to be replaced by the following:

b) *General Membership.*—The general membership, otherwise known as the active membership, shall consist of graduates of colleges of veterinary medicine who have been duly elected in the manner specified in the By-Laws.

[Purpose.—To remove ambiguities and detailed membership requirements from the Constitution. Detailed requirements are covered in the proposed amendments to the By-Laws.]

AMENDMENT NO. 2

To include a definition of Life Membership, present paragraph (d) of Article III, Constitution, is to be replaced by the following:

d) *Life Membership.*—The life membership shall consist of members who have been so designated in accordance with the Administrative By-Laws.

[Purpose.—To provide a new membership category in the Constitution as defined in the appropriate section of the By-Laws. Requirements for life membership are defined in new proposal No. 10 as Section 6 of Article X of the By-Laws.]

AMENDMENT NO. 3

To amend present paragraph (d) Article III, Constitution, and replace it with paragraph (e) Article III, Constitution, so that it will read as follows:

Student Chapter Membership.—The student chapter membership shall consist of members in good standing of the student chapters officially chartered by the Association and maintained in accordance with the Administrative By-Laws.

[Purpose.—To make the references to student chapter membership uniform throughout the Constitution and Administrative By-Laws.]

AMENDMENT NO. 4

To amend Section 2, Article IV, Constitution, relating to state, territorial, and provincial veterinary associations so as to read as follows:

Section 2.—The term "state, territorial and provincial association" shall be understood to mean the principal veterinary organization of any state of the Union, territorial possession of the United States including the District of Columbia, and provinces of the Dominion of Canada, whose membership requirements are equal to those of the American Veterinary Medical Association.

[Purpose.—To make this section compatible with Section 1, Article IV, in so far as membership requirements of the constituent associations are concerned.]

New Proposals

The following new proposals for amendments to the Administrative By-Laws were approved by the Executive Board at its winter meeting for submission to the House of Representatives for final action at the annual meeting of the House Aug. 18, 1951, in Milwaukee, Wis. They are published for the information of the membership and in accordance with Section 3, Article XVIII, of the Administrative By-Laws.

NEW PROPOSAL NO. 1

To amend Section 2, Article X, of the Administrative By-Laws relating to active members by replacing the present Section 2 with the following:

Section 2.—Active members, or the general membership, shall consist of graduates of colleges of veterinary medicine in the United States and Dominion of Canada that were approved by the Council and/or Committee on Education at the time of the applicant's graduation, or of graduates of foreign veterinary colleges that are approved by the Executive Board for membership purposes, and graduates of veterinary colleges formerly conducted in the United States which are approved by the Executive Board for membership purposes.

[Purpose.—To clearly define the schools from which graduates are eligible for membership and to place the responsibility for designating acceptable applicants upon the Executive Board.]

NEW PROPOSAL NO. 2

To replace present paragraph (a) of Section 2, Article X, Administrative By-Laws, with the following:

a) *Election to Active Membership.*—Candidates for membership shall present an application to the executive secretary on a special form approved by the Board of Governors. The form shall state the applicant's name, age, address, education (school and year of graduation), and work in which the applicant is engaged. Applicants residing within the jurisdictional limits of a constituent association, except personnel of the

Veterinary Corps and the United States Public Health Service, must obtain the certification of the secretary of the constituent association that has jurisdiction over the area in which the applicant is engaged in the pursuit of his profession, that the applicant has applied for or is a member in good standing of that constituent association. Applications from applicants who have only applied for membership in a constituent association shall be held in abeyance until notice is received from the secretary of said constituent association that the applicant is a member in good standing of that constituent association. Applicants residing outside the jurisdictional limits of the constituent associations shall obtain the endorsement, on the application, of two members who know the applicant, one or preferably both of whom reside in the same country as the applicant.

The American Veterinary Medical Association reserves the right to reject the application of any member of any constituent association. (As amended at the 85th Annual Meeting, Aug. 16-19, 1948.)

[Purpose.—To clearly define the eligibility of applicants for membership relative to their membership in a constituent association.]

NEW PROPOSAL NO. 3

To revise paragraph (b) of Section 2, Article X, by having paragraphs, 1 and 2, under (b) which pertain to the listing of applicants in the JOURNAL, read as follows:

1) The names of applicants residing within the jurisdictional limits of the constituent associations shall be published once in the JOURNAL.

2) Notice of all applications from applicants residing outside of the jurisdictional limits of the constituent associations shall be published in the JOURNAL for two successive months. The first notice shall give the applicant's full name, school and year of graduation, post office address, and the names of his endorsers. The applicant shall be declared elected and so notified thirty days after the final notice has been published, provided that, in the meantime, no objection to his election has been filed in writing. Objections to an applicant's election shall be subject to review and action by the Executive Board and decisions thereon shall be contained in the report of the Board to the House of Representatives. (As amended at the 78th Annual Meeting, Aug. 10-15, 1941.)

[Purpose.—To avoid unnecessary listings of names of applicants who are already members of constituent associations and save space in the JOURNAL.]

NEW PROPOSAL NO. 4

To substitute the following for present paragraph (c) of Section 2, Article X, Administrative By-Laws, which relates to the educational requirements of applicants:

c) *Educational Requirements.*—The "Essentials of an Acceptable Veterinary School" as defined by the Council on Education, or the accepted standards for an approved school at the time of the applicant's graduation, shall be considered the educational requirements of applicants, except for: (1) graduates of veterinary colleges formerly conducted in the United States, and (2) graduates of foreign veterinary colleges which have been approved for membership purposes by the Executive Board.

[Purpose.—To remove unnecessary detail in the By-Laws by referring to the "Essentials of an Acceptable Veterinary School" as prepared by the Council on Education and to delegate to the Executive Board the final decision on applicants who are not graduates of an approved school.]

NEW PROPOSAL NO. 5

To substitute for the present paragraph (b), of Section 3, Article X, Administrative By-Laws, which pertains to dropping members from the AVMA and constituent associations, the following paragraph which was inadvertently omitted from the present printing of the By-Laws:

b) Members who have not paid their annual dues by April 1 of the current year shall be dropped from the subscription list of the JOURNAL, in compliance with postal regulations governing the mailing of second class matter.

[Purpose.—To reinstate this paragraph in the By-Laws relative to discontinuing the mailing of JOURNALS to members who are in arrears in their dues payment.]

NEW PROPOSAL NO. 6

To amend paragraph (g), Section 3, Article X, Administrative By-Laws so that it will read as follows:

g) The JOURNAL shall be mailed only to members in accordance with section 3, paragraph (b) of this article and, by subscription, to reputable research laboratories, libraries, and schools; individuals and other institutions desiring the JOURNAL must be vouched for by the respective constituent associations.

[Purpose.—To make paragraph (g) refer to above paragraph (b) instead of paragraph 6.]

NEW PROPOSAL NO. 7

Add a new paragraph (h) to Section 3, Article X, Administrative By-Laws, which relates to the dropping of members from the AVMA and constituent associations, to read as follows:

h) When constituent associations adopt reciprocity of membership with the Association (*i.e.*, accept applications only from applicants who are, or who have applied for, membership in the American Veterinary Medical Association, and drop members from their association when they are dropped from membership in the American Veterinary Medical Association), the Association will also drop from its membership

any member who is dropped from the constituent association when so notified by the secretary of the constituent association. However, whether a constituent association has adopted reciprocity of membership or not, when members are expelled or dismissed from a constituent association for reasons of unethical conduct or other behavior detrimental to the profession, they will also be dropped from membership in the American Veterinary Medical Association when the executive secretary is so notified by the secretary of the constituent association.

[Purpose.—To clarify the relationship of membership in a constituent association to AVMA membership and to make reciprocity of membership possible.]

NEW PROPOSAL NO. 8

To delete Section 4, Article X, Administrative By-Laws, and replace with the following:

Section 4.—Student Chapter Members: (a) A student of an approved college of veterinary medicine which has a student chapter of the American Veterinary Medical Association may become a student chapter member by maintaining membership in his local student chapter. Student chapter members are entitled to all the privileges of active members at the annual session, except the right of franchise, and shall be furnished an official badge without payment of the registration fee.

[Purpose.—To make the reference to student chapter members uniform throughout the Constitution and Administrative By-Laws. Provisions of present Section 4 are covered in New Proposal No. 2.]

NEW PROPOSAL NO. 9

To transfer paragraph (a) of Section 5, Article X, Administrative By-Laws, to Section 4 and make it paragraph (b), and to make the wording uniform relative to student chapter members, the following changes are necessary (changes are in italics):

b) *Student Chapter Members.—Student chapter* members recommended as having been members in good standing for two years in their respective *student* chapters and who are vouched for by two members of the AVMA may be admitted to membership without the payment of the membership fee, provided the applications are filed within thirty days after the date of their graduation. To retain membership in the Association, members admitted under these provisions from *student* chapters must, within a period of three years following graduation, join a constituent association.

[Purpose.—To make paragraph (a) of Section 5 a subsection of the Section 4 on student chapter membership instead of a subsection of the honorary membership paragraph.]

NEW PROPOSAL NO. 10

To define life members, a new Section 6, of Article X, Administrative By-Laws, has to be added as follows:

Section 6.—Life Members: Members who have been in good standing in the Association for twenty-five years and who are not less than sixty-five years of age, and who, in the opinion of the Executive Board, should be relieved of further payment of dues, may be designated as life members, upon recommendation of the Executive Board and a majority vote of the House of Representatives. While life members may not hold office, they shall be allowed to participate in all regular meetings of the association, and shall be exempt from payment of dues.

Ralston Purina Research Fellowships

Dr. M. A. Emmerson, Iowa State College, and Dr. K. L. Turk, Cornell University, met with other members of the Ralston Purina Research Fellowship Awards Committee in St. Louis, March 26, to select the seven fellowship winners for the 1951-1952 school year.

The Committee, after reviewing 39 applications representing 28 colleges and universities, including two from Canada, awarded two fellowships each in poultry husbandry and dairy husbandry and three in animal husbandry.

The fellowships are awarded annually on the basis of merit. This year, two of those receiving 1950-1951 fellowships were reappointed for their second year of research study and one outstanding applicant was selected to receive his third consecutive fellowship award, the maximum number any individual can receive.

WOMEN'S AUXILIARY

Mrs. Rodgers, Chairman of the House of Representatives and Parliamentarian.—Mrs. C. M. Rodgers, Blandinsville, Ill., was born in Colo-

Mrs. C. M. Rodgers

rado. She received an A.B. degree from Ripon College in Wisconsin and an M.A. degree from Tufts College in Boston. Following her college work, she served as budget director of the American Association of University Professors. During Dr. Rodgers' army service, Mrs. Rodgers taught in various high schools and junior colleges.

Since their return to Blandinsville, Mrs. Rodgers has been active in church affairs and at the present time is a member of the Presbyterian women's state board and is state finance committee member for the Illinois Council of Church Women. She is the immediate past-president of the Auxiliary to the Illinois State Veterinary Medical Association and has served as secretary-treasurer of the Mississippi Valley Veterinary Medical Association auxiliary. Mrs. Rodgers is a capable person and interested member of the Auxiliary and, because of her experience in organizational work, is well qualified to fill the office of chairman of the House of Representatives of the Women's Auxiliary to the AVMA and as parliamentarian.

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Maine Auxiliary.—Mrs. J. F. Witter, Orono, held open house for the members of the Women's Auxiliary to the Maine Veterinary Medical Association on April 11, 1951. An inspection of the new animal pathology building on the University of Maine campus was enlightening and enjoyable. After a banquet at Estabrooke Hall, 15 members returned to Mrs. Witter's home for the business meeting. A *bon voyage* gift was presented to Mrs. S. G. Fine who is moving to Oklahoma City. Mrs. A. E. Coombs reported on the national auxiliary affairs. Cards were enjoyed the remainder of the evening.

s/(MRS. S. D.) EVELYN H. MERRILL, *Secretary.*

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Michiana Auxiliary.—The Women's Auxiliary to the Michiana Veterinary Medical Association met at Alby's Steak House, South Bend, Ind., April 12, with 23 members and 2 guests in attendance. Mrs. Carl Swartz gave an interesting talk on interior decorating. Three amendments to the constitution were read and passed. After a report from the standing committees, the meeting was adjourned.

s/MRS. DONALD L. MILLER

STUDENT CHAPTER ACTIVITIES

Michigan Chapter.—On Jan. 18, 1951, members of the Michigan State College Student Chapter of the AVMA heard **Dr. Lloyd Sholl,** of the M.S.C. faculty discuss "Postmortem Pathology of Small Animals" (with illustrations). Students attended the postgraduate conference for veterinarians held on the campus January 25-26. On February 1, **Dr. J. H. Benson,** Howell, was the guest speaker. **Dr. Morton Livingston** (MSC '50) addressed the February 15 meeting on "Problems of a New Large Animal Practice." Two motion pictures were shown on March 1. The following officers were elected at this meeting: Donald Spotts, president-elect; Eugene Hussey, vice-president; John Norton, secretary; David Wakefield, treasurer; Thomas Dunkin, sergeant-at-arms; Dr. John Stockton, faculty advisor.

s/JOHN NORTON, *Secretary.*

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Minnesota Club.—The following is a summary of the activities of the Veterinary Medical Club, University of Minnesota, for the winter quarter of 1951.

Several dignitaries, influential in the founding of the School, attended the January 10 meeting and were introduced by Dr. W. L. Boyd, director of the School of Veterinary Medicine. **Dr. W. M. Coffee,** president of the AVMA, discussed "Being a Veterinarian" at the February meeting. On March 8, officers were nominated for the coming year. **Mr. C. C. Champine,** an attorney, discussed the breeding and training of light horses. The following officers were elected for the coming year: Tony Zeher, president-elect; Henry Banal, vice-president; Charles Brown, secretary; Robert Windschitl, treasurer; and Douglas Haag, sergeant-at-arms. Former president-elect Glen Schubert became president. Drs. R. L. Kitchell and Henry J. Griffiths were elected as faculty advisors.

s/JOHN F. LARSON, *Retiring Secretary.*

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Missouri Chapter.—The University of Missouri Student Chapter of the AVMA met on March 12 to hear **Dr. Sam F. Scheidy,** veterinary medical director, Medical Research Division of Sharp and Dohme, discuss "Recent Trends in Veterinary Therapy."

s/ERNEST E. BURGESS, *Secretary.*

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Ontario Chapter.—Members of the Student Chapter of the Ontario Veterinary Association and the AVMA at the Ontario Veterinary College, Guelph, held their annual banquet in Creelman Hall on March 10. The trophy of the Chapter, awarded annually to the third year student who is voted most worthy of recognition for scholastic, athletic, and extra-curricular activities and also on the basis of personality, was presented to J. Duncan Smith of Unionville, Ontario.

A message from **Dr. A. L. MacNabb,** principal of the College, who has been ill for some time, was read by **Mr. L. E. Glenney,** president of the Chapter. **Dr. T. E. Salmon,** professor of Classics at McMaster University, Hamilton, was the guest speaker. He discussed "The World Crisis."

s/T. L. JONES, *Resident Secretary.*

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Pennsylvania Chapter.—A new attendance

record was set for the University of Pennsylvania Student Chapter of the AVMA when 105 members and 20 visitors attended the April 4 meeting to hear **Dr. William C. Glenney,** Ardmore, discuss his personal film library and show some of the films.

s/LYNN R. DERBY, *Secretary.*

APPLICATIONS

First Listing

BATORY, C. F.
1119 East King St., Lancaster, Pa.
V.M.D., University of Pennsylvania, 1936.
Voucher: R. C. Snyder.

BECHER, RALPH J.
1109 West 5th Ave., Columbus 12, Ohio.
D.V.M., Ohio State University, 1938.
Voucher: F. J. Kingma.

CONNER, ROBERT F.
Veterinary Hospital, Jasper, Ala.
D.V.M., Alabama Polytechnic Institute, 1943.
Voucher: I. S. McAdory.

FOURNIER, RICHARD O.
R.F.D. 2, Providence Pike, Woonsocket, R.I.
D.V.M., École de Médécine Véterinaire de la P.Q., 1950.
Voucher: J. S. Barber.

GOEN, OLIVER F.
1908 N.W. 2nd St., Gainesville, Fla.
D.V.M., Texas A. & M. College, 1947.
Voucher: V. L. Bruns.

GORIS, JAMES W.
1 The Spur, Syosset, L.I., N.Y.
V.M.D., University of Pennsylvania, 1947.
Voucher: J. S. Halat.

KLINE, R. E.
Melbourne, Iowa.
D.V.M., Iowa State College, 1950.
Voucher: Dr. F. B. Young.

LEATHERS, JOSEPH A.
Milaca, Minn.
D.V.M., McKillip Veterinary College, 1920.
Voucher: B. S. Pomeroy.

MISHKIN, HOWARD H.
6744 East End Ave., Chicago 49, Ill.
D.V.M., University of the Philippines, 1950.
Voucher: L. T. Hopkins.

OLDSEN, JOHN P.
Rockford, Iowa.
D.V.M., Iowa State College, 1930.
Voucher: F. B. Young.

PARKER, S. HERMAN
4641 Woodlawn Ave., Chicago 15, Ill.
D.V.M., University of the Philippines, 1950.
Voucher: L. T. Hopkins.

RICHMAN, HERBERT
Box 683, Murfreesboro, Tenn.
V.M.D., University of Pennsylvania, 1942.
Voucher: H. W. Hayes.

SCOTT, ROGER C.
1222 Robinson St., Knoxville, Iowa.
D.V.M., Iowa State College, 1938.
Voucher: F. B. Young.

SELGA, ISHMAEL S.
Tubao, La Union, Philippines.
D.V.M., University of the Philippines. 1951.
Vouchers: José B. Arañez and Arcadio C. Gonzaga.

SHIFFMAN, MORRIS A.
1032 East Knapp St., Milwaukee, Wis.
D.V.M., National Veterinary College of Alfort, 1949.
Voucher: B. A. Beach.

SMITH, MARVIN M.
R.R.5, Springfield, Tenn.
D.V.M., Alabama Polytechnic Institute, 1945.
Voucher: H. W. Hayes.

STALLINGS, EARL P.
3631 Westheimer, Houston 6, Texas.
D.V.M., Texas A. & M. College, 1943.
Voucher: E. A. Grist.

TRUDEL, LIONEL A.
290 Woodbury Ave., Portsmouth, N. H.
D.V.M., École de Médécine Véterinaire, Quebec, 1950.
Voucher: F. E. Allen.

Second Listing

BAKER, EDWARD, 568 Grand Ave., Englewood, N. J.
BENDIX, WILMER L., R.F.D. 13, Richmond 20, Va.
BORRE, OLUF, 309 Huron Ave., Spring Valley, Minn.
CONNEL, ALLAN A., JR., Box 23, Stillwater, Minn.
DICKSON, HOWARD S., 23 Second St., Delhi, N. Y.
ENGE, CLIFFORD O., St. James, Minn.
FRANK, B. N., Box 1083, Sterling, Colo.
HALL, EMERY A., 204 2nd St., N.E., Little Falls, Minn.
HENRY, JOHN F., 2230 Hillside Ave., St. Paul 8, Minn.
KLEAVELAND, RODNEY C., Sioux Rapids, Iowa.
MAXON, FAY I., Fairview Farms, Avon, Conn.
NAUMYK, FRANZ M., 2812 Jackson St., Dubuque, Iowa.
PEARSON, KERMIT C., 1151 Schley Butte, Mont.
PETER, NORMAN H., 244 Neil Ave., East Kildonan, Man.
ROWAN, ROBERT L., Linn, Mo.
SMITH, GEORGE K., Asheville Highway, Spartanburg, S. Car.

U. S. GOVERNMENT

Johnson Resigns from Foot-and-Mouth Disease Post.—Resignation of Harry H. Johnson as co-director of the Mexican-United States Commission for the Eradication of Foot-and-Mouth Disease was announced by Secretary of Agriculture Charles F. Brannan as effective May 1, 1951.

In asking to be relieved after three years as co-director, "General Johnson called attention to the promising success of the fight against

foot-and-mouth disease in Mexico and stated that his services were no longer needed in the present watchful waiting stage," according to a USDA press release. He has returned to his former position with an oil company in Houston, Texas.

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Veterinary Personnel Changes.—The following changes in the force of veterinarians in the U. S. Bureau of Animal Industry are reported as of April 13, 1951.

NEW APPOINTMENTS

EUGENE C. ALDRICH, Pierre, S. Dak.
JOSEF J. BRIKS, Boston, Mass.
HUNTER COHEN, Newark N.J.
AUGUSTO L. CRUZ, Waterloo, Iowa
LEONARD O. GOODLOE, Kansas City, Kan.
EVERETT A. LAIRD, San Antonio, Texas
RAYMOND B. LOMAX, West Fargo, N. Dak.
LYLE K. MILLER, Fort Worth, Texas
MONTGOMERY A. TEGG, Rochester, N.Y.
ROBERT H WILLIAMS, South St. Paul, Minn.
JOHN H. WINTER, Lansing, Mich.
JEHIM F. WONG, San Francisco, Calif.
Correction of New Appointment: C. Frederick Green, from Albany, N.Y., to Los Angeles, Calif.

RETIREMENTS

LESLIE H. BAKER, Fort Worth, Texas
HARRY E. BRECKERBAUMER, Sioux City, Iowa
CHARLES B. BREININGER, Baltimore, Md.
JOE W. GIFFEE, Des Moines, Iowa
ROYAL F. NORDSTRUM, Chicago, Ill.
CARL F. STROEHLEIN, Cincinnati, Ohio
DANIEL D. TIERNEY, South St. Paul, Minn.
GEORGE J. WORNER, Bismarck, N. Dak.
GEORGE A. YOUNG, Jefferson City, Mo.

DEATH

MILFORD D. BROOKS, Chicago, Ill.
JESSE B. SNYDER, Kansas City, Kan.
RAYMOND C. A. TAYLOR, Los Angeles, Calif.

MILITARY FURLOUGHS

WILLIAM L. BLACK, JR., Albuquerque, N. Mex.
CARL V. SIMMONS, JR., Springfield, Ill.

SEPARATED (MILITARY SERVICE)

DONALD H. MUSTARD, Louisville, Ky.

TRANSFERS

JOSEPH BARR, from Mexico City, Mex., to Baltimore, Md.
MERTON R. CLARKSON, from Washington D.C., to A.R.A.
WILLIAM W. GREEN, from Mexico City, Mex., to Philadelphia, Pa.
HUNTER E. KENDALL, from Mexico City, Mex., to Montgomery, Ala.
HORTON E. RYAN, from Mexico City, Mex., to Sacramento, Calif.

RESIGNATIONS

STEFAN ARTYMOWSKI, Chicago, Ill.
ZAKIE H. BRIDGES, Jacksonville, Fla.
ARTHUR W. BROWER, Nashville, Tenn.
PHILIP G. ELDREDGE, Boise, Idaho
THEODORE S. LIST, Los Angeles, Calif.

AMONG THE STATES AND PROVINCES

Alabama

Dr. Dorrough Appointed Commissioner of Public Welfare.—Dr Bill Dorrough (API '34), Leeds, began his duties as state commissioner of public welfare on March 1, 1951. Dr. Dorrough was with the U. S. BAI as a field veterinarian from 1934 to 1942. In 1942, he entered the Army as a first lieutenant and was discharged in 1946 with the rank of lieutenant

Dr. Bill Dorrough

colonel. He has been in private practice since that time. He was elected mayor of Leeds in 1936, and resigned that post to accept his present appointment. Dr. Dorrough served as adjutant of his American Legion post, as vice-president of the Leeds Chamber of Commerce, and on the Board of Directors of the Alabama League of Municipalities. He is a member of several civic organizations, of the Alabama State Veterinary Medical Association, and of the AVMA.

California

Southern Association.—The Southern California Veterinary Medical Association held a monthly meeting in Los Angeles on March 21. An interesting color motion picture showing operative correction of a diaphragmatic hernia was presented.

It was announced that the two bills to be introduced in the state legislature permitting brucellosis vaccination by laymen were withdrawn. It was also announced that a bill is being introduced in the legislature to prevent ear cropping in California.

s/R. W. SPROWL, *Secretary.*

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Dr. Stocking Accepts Position at Polytechnic College.—Dr. Gordon G. Stocking (MSC '46), formerly with the Department of Veterinary Medicine at the Upjohn Company, Kalamazoo, Mich., has accepted a position with the Kellogg Unit of California State Polytechnic College, Pomona. Dr. Stocking will be responsible for the Arabian horse breeding and showing program.

Georgia

South Georgia Association.—The South Georgia Veterinary Association met at the experiment station in Tifton on April 8, 1951. The new animal disease laboratory was inspected by the 68 members and guests in attendance. Speakers on the program included **Drs. G. Toliver,** Albany; **F. P. King,** Tifton; **B. E. Robertson,** Columbus; **C. C. Rife,** Atlanta; **Mr. F. Stubbs,** Atlanta; **Drs. E. D. King,** Valdosta; **A. M. Lee,** Arlington, Va.; and **Kurt Wagner,** Hannover, Germany. Members and their wives enjoyed dinner at the Alpine Restaurant.

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Animal Disease Research Workers.—The fifth annual meeting of the Animal Disease Research Workers in the southern states was held April 3-4, 1951, at the School of Agriculture, University of Georgia, Athens. The well-planned program included reports on results of phenothiazine experiments, uses of the various antibiotic agents, equine encephalomyelitis, work with parasites, bovine fertility, poultry diseases, nutrition problems, and small animal diseases.

Illinois

Eastern Association.—The spring meeting of the Eastern Illinois Veterinary Medical Association was held at the Hotel Tilden Hall, Champaign, on April 11. Dinner was served to 53 members and guests. **Dr. Eugene F. Lutterbeck, M.D.,** attending radiologist, Department of Radiation Therapy, Cook County Hospital, Chicago, presented an illustrated lecture on radiation therapy.

s/H. S. BRYAN, *Secretary.*

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Northern Association.—On April 11, the Northern Illinois Veterinary Medical Association met in the Hotel Faust, Rockford. The following speakers comprised the program: **Drs. W. A. Beard,** Greenview; **L. M. Hutchings,** chief of the Department of Veterinary Science, Purdue University, West Lafayette, Ind.; **K. W. Smith,** Sioux City, Iowa; and **G. R. Moore,** Michigan State College, East Lansing. The following men participated in a panel discussion on swine diseases: **Drs. L. M. Hutchings, L. M. Darst,** Princeton; **J. D. Ray,** Omaha, Neb.; **E. M. Rodgers,** Blandinsville; and **Ted Anderson,** moderator.

s/D. R. STEPHENSON, *Secretary.*

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Chicago Association.—At the April 10 meeting of the Chicago Veterinary Medical Association, **Dorothy Dockstader,** director of the placement bureau, DePaul University, discussed "Am I a Good Employer?" and **Dr. Joseph Greengard, M.D.,** discussed "The Possibility of Rabies from the Incidental Dog Bite."

s/ROBERT C. GLOVER, *Secretary.*

Personal.—Dr. C. L. McGinnis was elected president of the Rotary Club of Peoria at its April 19 meeting in the Jefferson Hotel.

Indiana

Michiana Association.—The Michiana Veterinary Medical Association met on April 12 at Albey's Steak House, South Bend. **Dr. Bob Oldhams** was guest speaker.

s/J. L. KIXMILLER, *Resident Secretary.*

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Ninth District Association.—The Ninth District (Ind.) Veterinary Medical Association met at the Seymour Country Club in Seymour recently. Dr. Roy Elrod, state veterinarian, discussed new Indiana regulations soon to go into effect.

s/J. L. KIXMILLER, *Resident Secretary.*

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Northeastern Association.—On April 10, the Northeastern Indiana Veterinary Medical Association met at the Hotel Van Orman in Fort Wayne to hear **Drs. G. R. Moore** and **W. F. Riley** of the Department of Veterinary Medicine, Michigan State College, discuss "Bovine Sterility."

s/CLARK WATERFALL, *Secretary.*

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Northwestern Association.—On March 29, the Northwestern Indiana Veterinary Medical Association met in Crown Point to hear **Dr. W. G. Magrane,** Mishawaka, discuss "Diseases of the Eyes." Officers of this association are Drs. Charles L. Lindborg, Monticello, president; M. D. Neuhauser, LaFayette, vice-president; and Galen E. Krill, Boswell, secretary-treasurer.

s/J. L. KIXMILLER, *Resident Secretary.*

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Tenth District Association.—**Dr. J. D. Ray,** Omaha, Neb., discussed diseases of swine at the April 12 meeting of the Tenth District Veterinary Medical Association (Indiana) in Muncie.

s/J. L. KIXMILLER, *Resident Secretary.*

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Wabash Valley Association.—**Mr. Wayne Guthrie** of the *Indianapolis News* told of his observations of the explosion of the atomic bombs at Bikini Island at the April 18 meeting of the Wabash Valley Veterinary Medical Association.

s/J. L. KIXMILLER, *Resident Secretary.*

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Institute of Animal Agriculture Meets at Purdue.—The first conference of the National Institute of Animal Agriculture was held at Purdue University, April 16-18, 1951. The Institute is a new organization formed during the past year to carry on the ideas and ideals of the late Mr. E. J. Babcock, of Cornell University, whose vision and efforts in promoting "animal

agriculture" are well remembered. In his talks and writings, he expounded the theme of better human nutrition, better land use, and more economical production and consumption of foods of animal origin as the answer to the problem of agricultural surpluses and expensive farm crop control programs. Mr. Babcock was the principal speaker at the AVMA convention banquet in Boston in 1946, his topic being "I Am Sticking With Livestock."

The principal purpose of this first conference was "to stimulate and inform key leadership in America as to the significance to our national economy of an expanded animal agriculture. This means the greater production and consumption of milk, meat, eggs, butter, cheese and other animal products." Prominent authorities in human and animal nutrition, soils, grassland management, and animal and poultry husbandry and related industrial organizations contributed to the three-day program. Animal health and good disease control were acknowledged as basic factors in any successful program of expanded animal production.

Dean H. J. Reed, of the College of Agriculture at Purdue, is chairman of the Institute and Dr. Karl D. Butler, Avco Manufacturing Corporation, Ithaca, N. Y., is secretary.

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Personals.—Dr. R. C. Klussendorf (COR '31) became associated with the Commercial Solvents Corporation as director of veterinary medical services for that corporation as of April 1, 1951. He was formerly editor-in-chief of the JOURNAL of the AVMA. Dr. and Mrs. Klussendorf will make their home in Terre Haute, Ind.

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Since Feb. 1, 1951, Dr. Wm. S. Carr (OSU '50), formerly in general practice in Lebanon, Ohio, has been associated in practice with Dr. F. C. Tucker (MCK '09), in Claypool.

Iowa

Southwestern Association.—More than 150 Iowa and Nebraska veterinarians attended the April 3 meeting of the Southwestern Iowa Veterinary Medical Association in Council Bluffs. The following speakers appeared on the program: **Drs. C. R. Schroeder,** Pearl River, N.Y.; **J. C. Carey,** West Liberty; **H. U. Garrett,** Des Moines; **C. W. Brown,** Des Moines; **E P. Anderson,** Lincoln, Neb.; **J. E. Peterman,** Lincoln, Neb.; **A. H. Quin,** Kansas City, Mo.; **H. E. Pinkerton,** Fort Dodge; **H. C. Smith,** Sioux City; and **H. W. Schoening,** Washington, D.C. The highlight of an interesting program was the discussion of modification and variations of hog cholera virus.

s/F. B. YOUNG, *Secretary.*

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East Central Society.—The East Central Iowa Veterinary Medical Society held a dinner meeting in Homestead on April 12. Speakers on the program included **Drs. C. D. Lee,** Ames; **P. V. Neuzil,** Blairstown; **Roger G. Feldman,** Kalona; and **John B. Bryant,** Mount Vernon.

s/W. H. THOMPSON, *Secretary.*

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Midwest Sanitary Officials Conference.—The tenth annual Midwest Sanitary Officials Conference was held at the Martin Hotel, Sioux City, May 3, 1951. Program speakers included **Dr. A. K. Kuttler,** Washington, D.C.; **Mr. D. H. Cunningham,** Sioux City; **Mr. John Brockway,** Sioux City; and **Dr. John Dewar,** Cherokee.

s/H. J. BOYTS, *Secretary.*

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Rabies in Cattle.—A herd of cattle near Ankeny was under treatment for rabies after 8 cows in the herd were bitten by a dog which died of rabies. Dr. P. K. Dougan diagnosed the disease in the dog and is caring for the herd involved. This is the first time in recent years that rabid cattle have been reported in Polk County.

s/KENNETH BOGAARD.

Kansas

Board of Health Reorganized.—The Kansas State Board of Health, formerly composed of nine physicians and one attorney, was reorganized by the recent legislature to include five physicians, a dentist, a veterinarian, a pharmacist, a sanitary engineer, and a hospital administrator.

s/CHAS. W. BOWER, *Resident Secretary.*

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Alumni-Senior Seminar.—On April 14, an alumni-senior seminar was held at the School of Veterinary Medicine, Kansas State College. It was an experiment initiated by Dean E. E. Leasure to create a better relationship between recent graduates and practitioners. Those selected to represent the alumni (practitioners) were Drs. J. A. Bogue, Wichita; Chas. W. Bower, Topeka; T. J. Leasure, Lawrence; and Jay Reynolds, Great Bend.

s/CHAS. W. BOWER, *Resident Secretary.*

Massachusetts

State Association.—**Dr. J. J. Malnati,** North Adams, discussed "The Management of Herd Breeding Problems" at the April 25 meeting of the Massachusetts Veterinary Association in the Hotel Beaconsfield, Brookline.

s/C. LAWRENCE BLAKELY, *Secretary.*

Michigan

Thumb District Association.—The Thumb District Veterinary Association met in the Montague Hotel, Caro, on March 8, 1951, with 35 veterinarians and their wives in attendance.

Two films "Veterinary Public Relations and Economics" and "Rabies in Domestic Animals," were shown. Dr. D. J. Ellis, Memphis, is president of this Association, and Dr. L. R. Newlin, Romeo, is secretary.

s/PAUL V. HOWARD, *Resident Secretary.*

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Western Association.—Thirty members and their wives attended the March 15 meeting of the Western Michigan Veterinary Association in Battle Creek to hear **Mr. Fischer,** manager of the Kellogg Experimental Farm (now a part of the College Experimental Farm) discuss their project of raising feeds on fertilized and unfertilized land and the results obtained at the College over a ten-year period.

Dr. James E. Cook, Holland, is president of this Association, and Dr. Paul V. Howard, Grand Rapids, is secretary.

s/PAUL V. HOWARD, *Secretary.*

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Whitney Club.—The Whitney Club met in Lyons, Ohio, on March 6. This group of southern Michigan and northern Ohio veterinarians has no officers, no dues, and no regular meeting date. At each meeting, a member of the group is chosen as host for the next meeting and he makes the arrangements for the dinner and meeting place, sets the date, and collects the price of the dinner. These group meetings were started years ago by Dr. J. C. Whitney of Hillsdale, Mich., and they have continued since then.

s/PAUL V. HOWARD, *Resident Secretary.*

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Personal.—Mrs. John W. Patton of East Lansing, Mich. (wife of Dr. John W.) died suddenly at her home April 7, 1951. The funeral was held in Lansing, Mich., April 11.

Missouri

Kansas City Association.—On April 17, the Kansas City Veterinary Medical Association met in the Hotel Continental to hear **Dr. Russell Borgmann,** Department of Pathology, Kansas State College, discuss "Practical Application of the Newer Insecticides to Animals." The film "Toxicology of Chlorinated Hydrocarbons" was shown through the courtesy of Dr. R. D. Radeleff, of the USDA Bureau of Entomology and Plant Quarantine, Kerrville, Texas.

s/K. M. CURTS, *Secretary.*

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Kansas City Small Animal Hospital Association.—Dr. Mark L. Morris, Topeka, Kan., discussed the value of the blood count and differential counts in the diagnosis and prognosis of some of the current small animal disease conditions at the April 1 meeting of the Kansas City Small Animal Hospital Association.

s/T. M. EAGLE, *Secretary.*

Southeastern Association.—Approximately 35 veterinarians, guests, and their wives attended the spring meeting of the Southeast Missouri Veterinary Medical Association on April 18 at the clinic of Dr. E. G. Bailey, Jr., in Dexter. The following speakers appeared on the program: **Drs. A. E. Bott,** East St. Louis, Ill.; **J. Q. Thurmond,** Eolia; **H. E. Curry,** Jefferson City; and **Mr. Jack Barnes,** Motorola Inc., St. Louis.

s/F. A. STEPP, *Secretary.*

Montana

Twin Calves Can't Make Trip to Maryland.—An appeal made recently by the U. S. BAI for identical twin beef calves to be used in experimental work at Beltsville, Md., brought an enthusiastic response from Montana stockmen. However, lack of funds makes it impossible for the Bureau to pay for the cost of shipment of calves from a distance greater than 400 miles.

Nevada

State Association.—The Nevada State Veterinary Medical Association met in Reno on April 6-7, 1951. The program included the following speakers: **Drs. E. E. Maas,** Reno; **W. F. Fisher,** Reno; **Lee Burge,** Reno; **R. A. Stocking,** Los Angeles; **Floyd R. Mencimer,** Ogden, Utah; and **James Farquharson,** Fort Collins, Colo. Officers of the association are Drs. W. R. Sheff, Reno, president; James R. Brown, Sparks, vice-president; and Edward Records, Reno, secretary-treasurer.

s/EDWARD RECORDS, *Secretary.*

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Quadruplet Calves.—Dr. George H. Caldwell (CVC '15), of Fallon, presided at the calving of quadruplets by a grade Hereford range cow that last year had twins. Dr. Caldwell estimated that

Dr. George H. Caldwell (left) and the quadruplets and one of the "buckaroos."

the "little fellows, 2 bulls and 2 heifers," uniform in markings and size, weighed about 40 lb. each at birth. The picture was taken three weeks after birth and the calves were doing nicely and were expected to live. The dam and calves are owned by Coffee Brothers, jewelers, who have large ranch holdings in Fallon (Churchill County).

It was not until last year, after practicing nearly forty years, that Dr. Caldwell participated in the delivery of triplets, when a Holstein-Friesian cow gave birth to 3 living calves; this year she delivered twins. This dam is owned by Grover Esson of Fallon.

New Jersey

American Animal Hospital Association.—The eighteenth annual meeting of the American Animal Hospital Association was held at Chalfonte-Haddon Hall, Atlantic City, May 2-5, 1951.

Guest speakers were **Drs. J. A. Baker,** New York State Veterinary College, Ithaca; **Frank Bloom,** Long Island University, Flushing, N.Y.; **Victor Cabasso (Sc.D.)** Lederle Laboratories, Pearl River, N.Y.; **D. K. Detweiler, Jacques Jenny,** and **J. T. Mcgrath,** University of Pennsylvania School of Veterinary Medicine, Philadelphia; **W. T. Fitts, Jr. (M.D.),** University of Pennsylvania School of Medicine, Philadelphia; **E. H. Hanson (L.H.D.),** president, Massachusetts SPCA, and American Humane Education Society, Boston; **Laurent Michaud,** Merck and Co., Rahway; **J. C. Munch (Ph.D.),** president. Munch Research Laboratories, Philadelphia; and **Mr. W. E. Carlson (M.Sc.),** Fromm Laboratories, Grafton, Wis.

Member speakers included **Drs. M. W. Allam,** University of Pennsylvania School of Veterinary Medicine, Philadelphia; **L. R. Barto,** Basking Ridge; **C. W. Bower,** Topeka, Kan.; **W. O. Brinker,** Michigan State College School of Veterinary Medicine, East Lansing; **J. E. Crawford,** Lynbrook, N.Y.; **J. S. Crawford,** New Hyde Park, N.Y.; **J. R. Currey,** Washington, D.C.; **J. B. Engle,** Summit; **S. W. Haigler,** St. Louis, Mo.; **C. E. Hofmann,** Tulsa, Okla.; **H. E. Jensen,** Cleveland, Ohio; **W. G. Magrane,** Mishawaka, Ind.; **R. B. McClelland,** Buffalo, N.Y.; **J. A. S. Millar,** Deal; **L. C. Moss,** Fort Collins, Colo.; **W. H. Riser,** Skokie, Ill.; **R. E. Ruggles,** Moline, Ill., **G. B. Schnelle,** Boston, Mass.; **H. C. Stephenson,** Ithaca, N.Y.; **W. L. Weitz,** Buffalo, N.Y.; **Janet M. Willetts,** Los Angeles, Calif.

s/W. H. RISER, *Executive Secretary.*

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Dr. E. W. Smillie Honored.—Dr. Ernest W. Smillie, the first and only superintendent of the Department of Animal and Plant Pathology of the Rockefeller Institute for Medical Research at Princeton, was signally honored at a dinner at the Princeton Inn on Monday evening March 3, 1951, when a large gathering of friends from all walks of life paid tribute to his many years of service to the community where he lived and to the state. Dr. Smillie had the rare distinction of serving on the State Board of Health under five chief executives, namely, Governors Harold G. Hoffman, H. Harry Moore, Charles Edison, Walter E. Edge, and Alfred E. Driscoll. He became a member of the Board in 1935 and for the next twelve years laid the groundwork for streamlining and revising the work of the department and the code under which it operates.

Dr. Smillie was born in Eaton, Colo., spent his youth as a "horse wrangler" on a ranch, and took his work in veterinary medicine at Iowa State College, graduating in 1916. He came to the Rockefeller Institute the same year and worked under the inspiring guidance of the late Dr. Theobald Smith, its first director, and was associated with much of the early research on animal diseases conducted by Dr. Smith and his staff. As the work of the Institute broadened and the physical plant expanded, he devoted most of his time to superintending the laboratories and the several hundred acres of farmland, buildings, and equipment.

Dr. Smillie was secretary of the Plainsboro village council or "town meeting" for several years and a former trustee of Princeton Hospital. Outstanding in the presentations made to him at the dinner in his honor was a scroll, signed by the five governors of New Jersey under whom he served, which read as follows:

THE STATE OF NEW JERSEY

Know All Men by These Presents:

THAT having during our terms of office reposed special trust and confidence in the integrity, diligence, discretion, faithfulness and scientific attainments of

ERNEST WILLIAM SMILLIE, D.V.M.

and further being desirous of giving recognition to his valued contribution to the forward movement of his public health program in New Jersey; now,

Therefore, we the undersigned Governors of the State of New Jersey have hereunto affixed our signatures to this scroll as evidence of our continued esteem and respect.

Harold G. Hoffman — Charles Edison
H. Harry Moore — Walter E. Edge
Alfred E. Driscoll

Presented at Princeton, N. J., March 3, 1951

The *Princeton Town Topics* (March 11, 1951) also nominated Dr. Smillie as "man of the week" for "his distinguished supporting role in the sphere of science; for his contributions to the forward movement of New Jersey's public health program; and for sharing with others his capacities for community leadership."

New York

New York City Association.—The regular meeting of the Veterinary Medical Association of New York City, Inc., was held at the Hotel Statler, April 4, 1951. **Dr. E. W. Dennis,** director, Biology Division, Sterling-Winthrop Research Institute, Rensselaer, discussed "The Development of Veterinary Drugs." The motion picture "Fractures" was shown through the courtesy of Johnson and Johnson, New

Brunswick, N.J. Dr. S. Howard Padwee, Newark, N. J., was announced as a new member.

s/C. R. SCHROEDER, *Secretary.*

North Carolina

Roanoke-Tar Association.—On April 6, the Roanoke-Tar Veterinary Medical Association met in Rocky Mount for a round-table discussion of practice problems. Approximately 35 veterinarians and their wives attended this meeting.

s/J. H. BROWN, *Resident Secretary.*

• • •

Practice Act Amended.—The Veterinary Practice Act of North Carolina has recently been amended to provide that only graduate veterinarians from accredited veterinary colleges may take the examination before the Examining Board. Heretofore, anyone could take the examination. Also, the fee for board examinations was raised from $10 to $25.

s/J. H. BROWN, *Resident Secretary.*

Ohio

Fraternity Holds Recognition Banquet.—The Omega Tau Sigma veterinary fraternity at Ohio State University honored three veterinarians and two veterinary students at its annual recognition banquet April 1. Drs. H. A. Lidikay and C. W. Montgomery received Gamma Keys for their contributions in promoting the veterinary profession and Omega Tau Sigma. Dr. Lidikay is a practicing veterinarian at Darlington, Ind., and Dr.

Seated (left to right)—Drs. B. T. Simms and H. A. Lidikay. Standing—Paul Myers, Dr. C. W. Montgomery, and Richard Bixler. Inset—Owen Ranstead.

Montgomery is a small animal practitioner in Cincinnati. Paul Myers and Richard Bixler, seniors in the College of Veterinary Medicine, were presented with Active Gamma Keys for outstanding work in the fraternity.

The custom of recognizing outstanding persons in the veterinary profession was established by the Gamma Chapter in 1947. Dr. B. T. Simms, chief of the U.S. BAI, was the recipient of the 1951 National Gamma Award.

s/OWEN A. RANSTEAD, *Chairman, Gamma Award Committee.*

• • •

Stark County Association.—Officers of the reorganized Stark County Veterinary Medical Association are Drs. E. F. Donovan, North Canton, president; C. J. Hook, Massillon, vice-president; and W. B. Grigor, Hartville, secretary-treasurer.

s/W. B. GRIGOR, *Secretary.*

• • •

Veterinarians Suspended for Fraudulent Reports.—Dr. H. G. Geyer, state veterinarian, announced in March, 1951, that Drs. R. E. Leupp, Columbus, and C. E. Stuck, Mt. Victory, had their federal accreditation suspended as a result of fraudulent reports relative to tuberculin testing of cattle. They were injecting cattle with tuberculin in the approved manner but failed to make proper examinations at the proper interval and, in a number of instances, failed to visit the farms and yet rendered reports that the cattle had been examined at the proper time and tests read.

After a thorough investigation, the men were called before the state and federal veterinarians and the Board of Veterinary Examiners who unanimously concurred in the decision. In commenting on the action, Dr. Geyer said: "The veterinarian must realize his is an honorable profession that warrants the fullest integrity and trust. The offense was not against the state or federal offices, but against the livestock producers who respect his honest council and guidance in the control or eradication of diseases."

Ontario

Presentation of Portrait.—A ceremony was held at the Ontario Veterinary College on March 10 to mark the presentation and hanging of a portrait of Dr. R. A. McIntosh, head of the Department of Medicine, who is completing his thirty-second year of service to the College.

The portrait, painted by Evan Macdonald of Guelph, was presented by Dr. G. H. Hood on behalf of the class of '50 (OVC), of which he is president.

Guests were received by Dr. and Mrs. T. L. Jones; Dr. and Mrs. R. A. McIntosh; Dr. and Mrs. J. D. MacLachlan (he is president of the Ontario Agricultural College); and Mr. and Mrs. C. D. Graham (he is deputy minister of agriculture for Ontario).

s/T. L. JONES, *Resident Secretary.*

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Overseas Students and Dr. Schofield Honored.—The Ontario Veterinary College was host, on March 3, 1951, at a social gathering honoring 15 overseas students representing six coun-

tries (British West Indies, Bermuda, British Guiana, South Wales, Lithuania, and Palestine). Other guests included faculty members and their wives, class presidents, and officials of the Student's Administrative Council.

During the evening, Dr. Frank W. Schofield,

Dr. T. L. Jones (right), acting principal of the Ontario Veterinary College is shown presenting the Doctor of Veterinary Medicine (honoris causa) parchment to Dr. F. W. Schofield on behalf of the Ludwig-Maximilian University of Munich.

head of the Department of Pathology, was honored when he was presented by proxy with the degree of Doctor of Veterinary Medicine (*honoris causa*) by the veterinary faculty of the Ludwig-Maximilian University of Munich, Germany, in recognition of his outstanding services to science and humanity. The degree was actually conferred in Germany *in absentia* last November.

S/T. L. JONES, *Resident Secretary.*

Texas

Panhandle Association.—The Panhandle Veterinary Medical Association met in Childress on April 14. Speakers on the program included **Drs. E. A. Grist,** New Braunfels; **Oral M. Sanders,** Ada, Okla.; **Guy Railsback,** Berkeley, Calif.; **J. D. Williams,** Colorado City; and **N. A. Cox,** Lubbock.

S/LEON G. CLOUD, *Resident Secretary.*

• • •

South Central Association.—On April 12, 1951, the South Central Texas Veterinary Association held a poultry disease conference at Cuero. **Drs. T. Cartrite, J. C. Sehweda,** Gonzales; **C. R. Tubbs,** Cuero; **W. A. Boney, Jr., J. P. Delaplane,** and **L. C. Grumbles,** College Station, were speakers on the program.

S/LEON G. CLOUD, *Resident Secretary.*

• • •

West Central Association.—The West Central Texas Veterinary Association met in Brownwood, April 14. The program included the following speakers: **Drs. G. A. Kay,** state veterinarian; **Hugh T. Cartrite,** Texas A. & M. Poultry Experiment Station, Gonzales; **Col. Geo. T. Price,** Ft. Sill, Oklahoma; and **Mr. C. Griffin,** Quaker Oats Co., Fort Worth. Several films were shown, and the meeting was concluded with discussion of clinical cases and practice problems.

S/LEON G. CLOUD, *Resident Secretary.*

FOREIGN NEWS

Philippine Islands

Death of Dr. Gapuz.—Dr. Domingo B. Gapuz, of the Philippine Bureau of Animal In-

Faculty Members of the Oklahoma A. & M. College School of Veterinary Medicine

Front row (left to right)—Drs. J. D. Barak, clinics and medicine; J. W. Wolfe, director of clinics; C. H. McElroy, dean of the School; H. W. Orr, physiology; E. E. Harnden, bacteriology; C. J. Hardin, clinics and surgery; R. L. Butler, clinics and surgery.

Second row—Drs. J. D. Friend, anatomy; D. R. Peterson, anatomy; G. D. Goetsch, physiology; L. H. Moe, clinics; W. R. Rice, clinics and surgery; C. N. Barron, diagnostic laboratory; G. E. Short, veterinary pathology.

Third row—Drs. F. R. Knotts, clinic; W. H. Krull, parasitology; Robert Rubin, pathology; D. M. Trotter, pathology; W. D. O'Mars, anatomy; N. B. Tennille, medicine and clinic.

dustry, died Sept. 30, 1950, at the age of 44 years, from heart failure. After receiving his D.V.M. degree from the University of the Philippines in 1934, Dr. Gapuz served as an instructor at the Nanning School of Veterinary Science and as veterinarian for the BAI in Kwangsi, China. In 1937, he joined the Philippine Bureau of Animal Industry as an assistant veterinarian and later became assistant zoötechnist. He was sent to the United States as a government pensionado in 1941 to specialize in leather technology and in the industrial utilization of animal by-products. He was granted the degree of M.Sc. from the University of Cincinnati where he was for a time an assistant professor. While there, he conducted several research projects, the results of which he published while in this country. He returned to his home in 1947.

Dr. Gapuz was a member of several scientific organizations including the Philippine Veterinary Medical Association and the AVMA.

The Philippine Republic lost a distinguished leather technologist and a conscientious research worker with the death of Dr. Gapuz.

s/JOSE B. ARANEZ, *Foreign Corresponding Secretary.*

• • •

Personal.—Dr. José B. Arañez is foreign corresponding secretary for the AVMA in the Philippine Islands. He was appointed to this position by President W. M. Coffee in September, 1950.

VETERINARY MILITARY SERVICE

Air Force National Consultants Conference.—The semi-annual National Consultants Conference was held at the office of the Surgeon General, U.S. Air Force, on April 27-28. Major General Harry G. Armstrong, surgeon general, outlined the conference objectives.

During the first day, directors and division heads discussed current veterinary problems along with various medical, dental, and nursing programs. The second day was devoted to brief talks by the consultants themselves on similar problems and situations in the medical fields.

Dr. Walter R. Krill, dean, College of Veterinary Medicine, Ohio State University, was the veterinary medical representative at this meeting.

EMERGENCY PLANNING

Dr. Clarkson Continues as N.S.R.B. Consultant

Dr. M. R. Clarkson is continuing to function as a veterinary medical consultant to the Health Resources Office of the N.S.R.B. in addition to his other important civil defense duties (see May JOURNAL, p. 351). At the time the article, "The Organization of Veterinarians for Civil Defense" (JOURNAL, March, 1951: 142) was published, news of Dr. Clarkson's appointment had not been received. He and Dr. Asa Winter are serving as veterinary medical consultants to the Health Resources Office.

STATE BOARD EXAMINATIONS

Maryland—The State Board of Veterinary Medical Examiners of Maryland will hold its annual examination on June 23, 1951, in the Osler Hall at 1211 Cathedral St., Baltimore, Md., at 10:00 a.m. Candidates must be graduates of an accredited college of veterinary medicine and citizens of the United States. Hulbert Young, Owings Mills, Md., secretary.

Nebraska—The Nebraska State Board of Veterinary Examiners announces a two-day written examination for licensing eligible graduate veterinarians on June 26-27, 1951. The examination will begin at 8:00 a.m. on June 26 at the State Capitol Building in Lincoln. Application should be made well in advance to the Bureau of Examining Boards, State Capitol Building, Lincoln, Neb., for the proper blanks and information.—s/F. R. Woodring, secretary.

Ohio—The Ohio Board of Veterinary Examiners will conduct an examination on June 5-6, 1951, in the Clinic Building, College of Veterinary Medicine, Ohio State University, Columbus, Ohio. Applicants should be present at 8 a.m. on June 5. Those not graduates of Ohio State University should supply the Division with a photograph showing the head and shoulders and a photostatic copy of their certificate of graduation by May 31. H. G. Geyer, Division of Animal Industry, Department of Agriculture, Columbus 15, Ohio, secretary, *ex officio.*

MARRIAGES

Dr. R. C. Mobley (GA '50) to Miss Katherine Quinn of Chattanooga, Tenn., on Jan. 6, 1951.

Lt. Richard H. Detwiler (UP '48), V.C., to Miss Grace Anderson, Reading, Pa., on March 24, 1951. Lt. Detwiler is now stationed at the Schuylkill Arsenal.

BIRTHS

Dr. (UP '43) and Mrs. John T. McGrath, Philadelphia, Pa., announce the birth of a son, Joseph Timothy, on March 29, 1951.

Dr. (API '42) and Mrs. Daniel E. Kallman, Henderson, N. Car., announce the birth of a daughter, Carol Ann, on March 9, 1951.

Dr. (API '45) and Mrs. C. W. Stroup, Somerville, Tenn., announce the birth of a son, Jesse Reeves.

Dr. (KSC '46) and Mrs. R. H. Spencer, Scott City, Kan., announce the birth of a son, Richard Burgess, on April 5, 1951.

Dr. (KSC '43) and Mrs. W. B. Miesse, Memphis, Tenn., announce the birth of a daughter, Barbara Jean.

DEATHS

George C. Abel (STJ '16), 68, Scott City, Kan., died early in January, 1951. Dr. Abel had been a member of the AVMA.

★**Edwin M. Austin** (ISC '18), 56, Highland, Calif., died Feb. 19, 1951, at his home. At the time of his death, he was supervising district veterinarian, State Department of Agriculture. Dr. Austin was a member of the California Veterinary Medical Association and of the AVMA. He is survived by his widow, a daughter and a son.

William H. Boyle (KCV '16), 61, Schuyler, Neb., died Dec. 15, 1949. Dr. Boyle was a member of the Nebraska Veterinary Medical Association and had been a member of the AVMA.

Milford D. Brooks (CVC '14), Hebron, Ill., died Jan. 24, 1951. Dr. Brooks was a part-time meat inspector for the Chicago Health Department and also carried on a general practice.

Jared Burton (ONT '02), 79, Wheaton, Minn., died in 1950. Dr. Burton had been a member of the AVMA.

★**Melvin W. Downing** (GR '04), 70, Waukesha, Wis., died Feb. 8, 1951, at his home. Dr. Downing was a member of the Wisconsin Veterinary Medical Association and of the AVMA.

★**D. H. Eastman** (OSU '21), 57, Aledo, Ill., died Feb. 10, 1951, after a long illness. Dr. Eastman had been associated with the Illinois Division of Animal Industry for several years and had been a member of the Illinois Veterinary Medical Association since 1926. He was admitted to the AVMA in 1942.

★**George C. Faville** (ISC '80), 95, Emporia, Va., died Feb. 16, 1951. Dr. Faville was admitted to the AVMA in 1888.

Wm. W. Fox (UP '06), 67, Hummelstown, Pa., died Dec. 16, 1950. Dr. Fox was a general practitioner.

★**Domingo B. Gapuz** (PHI '34), 44, Pandacan, Manila, P.I., died Sept. 30, 1950, of heart failure. An obituary appears on page .... of this JOURNAL. Dr. Gapuz was a member of the AVMA.

★**Clifford L. Hall** (USC '10), 68, Sidney, Ohio, died Feb. 27, 1951. Dr. Hall was a member of the National Association of Federal Veterinarians and of the AVMA.

★**Walter F. Holmgren** (IND '22), 57, Lake Benton, Minn., died Feb. 18, 1951, as the result of an automobile accident. Dr. Holmgren had practiced in Lake Benton since 1924. He was admitted to the AVMA in 1925.

★**Alfred G. Hutton** (USC '17), 58, Lexington, Va., died recently. Dr. Hutton was a member of the AVMA for forty-four years.

★**DeWitt LaGrange** (COR '19), 55, Harrisburg, Pa., died March 19, 1951. Dr. LaGrange had been in the BAI for nearly thirty years during which time he had worked in Minnesota, Maine, New York, and the last twenty-one years in Pennsylvania. Until February, 1951, he was assistant inspector in charge at Harrisburg when he was promoted to inspector in charge of the import station at Ogdensburg, N.Y. Dr. LaGrange was a member of the Pennsylvania Veterinary Medical Association, the National Association of Federal Veterinarians, and of the AVMA.

★**William S. Lord** (HAR '90), 82, Portland, Maine, died on Feb. 22, 1951, after a short illness. Dr. Lord was a charter member of the Maine Veterinary Medical Association and served as temporary secretary until its constitution was written. He also served as treasurer in 1904 and as vice-president in 1905. He was for many years an honorary member of the association. He was admitted to the AVMA in 1924.

★**John J. Strandberg** (CVC '16), 65, Belle Plaine, Iowa, died March 20, 1951, after a brief illness. Dr. Strandberg had practiced in Belle Plaine since 1918. He served as secretary-treasurer of the Eastern Iowa Veterinary Medical Association from 1935 to 1937 and as president in 1938. From 1941 to 1947, he was mayor of Belle Plaine. Dr. Strandberg was admitted to the AVMA in 1919. He is survived by his widow.

L. R. Sullivan (API '23), 54, Poughkeepsie, N. Y., died Dec. 26, 1950. Dr. Sullivan, who was employed by the U. S. Bureau of Animal Industry since receiving his D.V.M. degree, had resided in Poughkeepsie since 1939. He had been a member of the AVMA. Dr. Sullivan is survived by his mother and his widow.

William Tennant (ONT '08), 69, Bowmanville, Ont., died June 2, 1950. Dr. Tennant was a superannuated employee of the Health of Animals Division. He is survived by his widow, two daughters, and one son. Dr. Tennant had been a member of the AVMA.

C. C. Wadsworth (OSU '11), 63, Mansfield, Ohio, died Jan. 27, 1951. Dr. Wadsworth had been a member of the AVMA.

E. E. Walters (CHI '12), Albert City, Iowa, died Sept. 12, 1950.

J. J. Williams (CVC '13), 76, Fort Dodge, Iowa, died Nov. 19, 1950, after a lingering illness. Dr. Williams had retired from general practice some time ago.

★**M. H. Wills** (OSU '21), 58, Ridgefarm, Ill., died Feb. 7, 1951. Dr. Wills was a member of the AVMA.

★Indicates members of the AVMA.

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An Related Topics

COMING MEETINGS

Notices of Coming Meetings must be received by 4th of month preceding date of issue

Kansas State College. Annual conference for veterinarians. Kansas State College School of Veterinary Medicine, Manhattan, Kan., June 1-2, 1951. E. R. Frank, chairman.

Texas Veterinary Conference. School of Veterinary Medicine, A. & M. College of Texas, College Station, Texas, June 7-8, 1951. R. D. Turk, chairman, conference committee.

Alabama Polytechnic Institute. Annual conference for veterinarians. Alabama Polytechnic Institute School of Veterinary Medicine, Auburn, Ala., June 7-9, 1951. R. S. Sugg, dean.

North Carolina State Veterinary Medical Association. Annual meeting. Hendersonville, N. Car., June 8-9, 1951. J. H. Brown, Tarboro, N. Car., secretary.

American Society for the Study of Sterility. Annual meeting. Ritz-Carlton Hotel, Atlantic City, N.J., June 8-10, 1951. Walter W. Williams, 20 Magnolia Terrace, Springfield 8, Mass., secretary.

North Dakota Veterinary Medical Association. Annual meeting. Rudolph Hotel, Valley City, N. Dak., June 10-12, 1951. T. O. Brandenburg, Capitol Building, Bismarck, N. Dak., secretary.

South Carolina Veterinary Medical Association. Annual meeting. Clemson House, Clemson, S. Car., June 10-12, 1951. R. A. Mays, Columbia, S. Car., secretary.

Oklahoma conference for veterinarians. June 11-12, 1951, veterinary clinic, Oklahoma A. & M. College, Stillwater, Okla. J. W. Wolfe, Oklahoma A. & M. College, School of Veterinary Medicine, Stillwater, Okla., chairman.

Ohio State University. Annual conference for veterinarians. College of Veterinary Medicine, The Ohio State University, Columbus, June 13-15, 1951. R. E. Rebrassier, chairman.

Georgia Veterinary Medical Association. Annual meeting. Atlanta Biltmore Hotel, Atlanta, Ga., June 16-18, 1951. Chas. C. Rife, 420 Edgewood Ave., N.W., Atlanta, Ga., secretary.

Idaho Veterinary Medical Association. Annual meeting. Shore Lodge, McCall, Idaho, June 18-19, 1951. Arthur P. Schneider, Department of Agriculture, Boise, Idaho, secretary.

Communicable Disease Center. Short course in laboratory diagnosis of rabies. School of Veterinary Medicine, University of Missouri, Columbia, Mo., June 18-22, 1951. Applications should be directed to Dr. R. F. Reider, in charge, Laboratory Training Services, CDC, Public Health Service, P. O. Box 185, Chamblee, Ga.

Vermont Veterinary Medical Association. Annual summer meeting. Basin Harbor Club, Vergennes, Vt., June 21-22, 1951. W. D. Bolton, Burlington, Vt., secretary.

Montana Veterinary Medical Association. Annual meeting. Bozeman, Mont., June 21-23, 1951. E. A. Tunnicliff, Veterinary Research Laboratory, Agricultural Experiment Station, Bozeman, Mont., secretary.

Wyoming Veterinary Medical Association. Annual meeting. Worland, Wyo., June 24-25, 1951. O. E. Bunnell, Box 132, Worland, Wyo., secretary.

Missouri Veterinary Medical Association. Annual summer meeting. Robidoux Hotel, St. Joseph, Mo., June 25-26, 1951. J. L. Wells, Box 676, Kansas City, Mo., secretary.

California State Veterinary Medical Association. Annual meeting. Mar Monte Hotel, Santa Barbara, Calif., June 25-27, 1951. Charles S. Travers, 3004 16th St., Rm. 208, San Francisco, Calif., executive secretary.

(Continued on p. 26)

Because of limited space in this issue, the "Watch Your English" column is omitted. The column will be resumed in the July JOURNAL.

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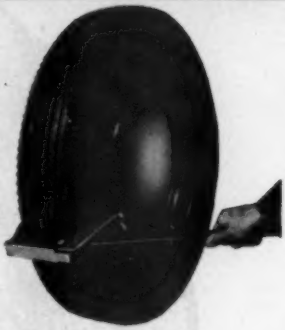

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(COMING MEETINGS — *continued from p. 24*)

Massachusetts Institute of Technology. Special course in food technology. Massachusetts Institute of Technology, Cambridge 35, Mass., June 25 to July 13, 1951. Professor Walter H. Gale, director of the summer session.

Maritime Veterinary Associations (New Brunswick, Nova Scotia, and Prince Edward Island). Annual joint conference. Mount Allison University, Sackville, New Brunswick, June 26-28, 1951. J. F. Frank, P.O. Box 310, Sackville, New Brunswick, secretary.

Maryland State Veterinary Medical Association. Annual summer meeting. George Washington Hotel, Ocean City, Md., June 28-29, 1951. John D. Gadd, Towson 4, Md., secretary.

New York State Veterinary Medical Society. Annual meeting. Mark Twain Hotel, Elmira, N.Y., July 10-13, 1951. J. S. Halat, 1231 Gray Ave., Utica, N.Y., executive secretary.

Kentucky Veterinary Medical Association. Annual summer convention. Seelbach Hotel, Louisville, Ky., July 11-12, 1951. T. J. Stearns, Livestock Exchange Building, Room 114, Bourbon Stockyards, Louisville, Ky.

American Veterinary Medical Association. Annual meeting. Milwaukee Auditorium, Milwaukee, Wis., Aug. 20-23, 1951. J. G. Hardenbergh, American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Canadian Veterinary Medical Association. Third annual meeting. Banff Springs Hotel, Banff, Alta., Sept. 8-11, 1951. J. G. Anderson, 1016 9th Ave. W., Calgary, Alta., chairman, local committee.

Second International Gerontological Congress. Hotel Jefferson, St. Louis, Mo., Sept. 9-14, 1951. E. V. Cowdry, 660 South Kingshighway, St. Louis 10, Mo., president.

(*Continued on p. 28*)

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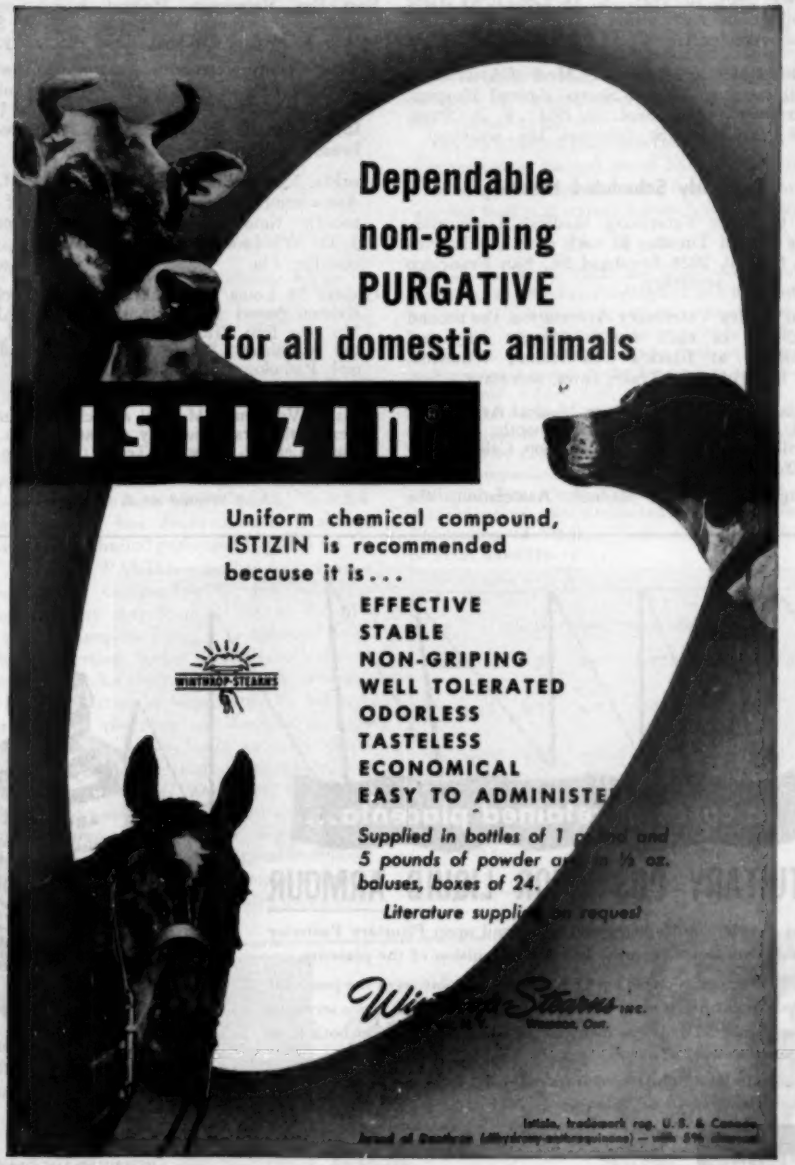
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Nutritional Conference for Veterinarians. Annual conference, Iowa State College, Ames, Iowa, Sept. 13, 1951. C. D. Lee, Iowa State College of Agriculture, Ames, Iowa, extension veterinarian.

Southeast Missouri Veterinary Medical Association. Fall meeting. W. R. Sheets' Animal Hospital, Farmington, Mo., Sept. 19, 1951. F. A. Stepp, 405 West North St., Sikeston, Mo., secretary.

Regularly Scheduled Meetings

Bay Counties Veterinary Medical Association, the second Tuesday of each month. Howard F. Carroll, 2024 Lombard St., San Francisco 23, Calif., secretary.

Cedar Valley Veterinary Association, the second Monday of each month (except July and August) at Black's Tea Room, Waterloo. F. E. Brutsman, Traer, Iowa, secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Thomas Eville, Route 1, Box 136H, Fresno, Calif., secretary.

Chicago Veterinary Medical Association, the second Tuesday of each month. Robert C. Glover, 1021 Davis St., Evanston, Ill., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. O. A. Soave, 5666 Telegraph, Oakland, Calif., secretary.

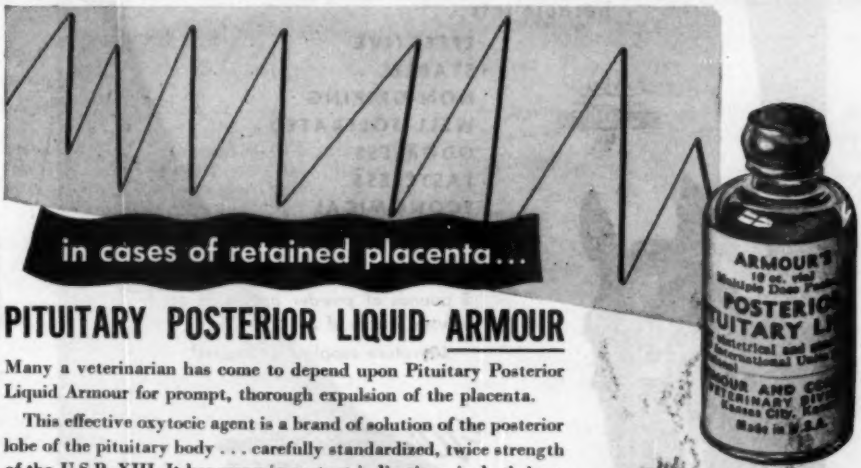
Fayette County Veterinary Association, Iowa, the third Tuesday of each month, except in July and August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Florida, North-East Florida Veterinary Medical Association, the second Thursday of each month, time and place specified monthly. J. O. Whiddon, 829 San Marco Blvd., Jacksonville, Fla.

Greater St. Louis Veterinary Medical Association. Ralston-Purina Research Building, St. Louis, Mo., the first Friday in February, April, June, and November. W. C. Schofield, Dept. of Animal Pathology, Ralston-Purina Co., St. Louis 2, Mo., secretary.

Houston Veterinary Medical Association, Houston, Texas, the first Thursday of each month. Edward Lepon, Houston, Texas, secretary-treasurer.

(*Continued on p. 30*)



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This effective oxytocic agent is a brand of solution of the posterior lobe of the pituitary body . . . carefully standardized, twice strength of the U.S.P. XIII. It has many important indications in both large and small animal practice.

It should be administered intravenously . . . never subcutaneously. It is available in 10 cc vials.

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The PARD "4-STAR" STORY

New findings show how right you've been in recommending PARD

Since PARD came on the market in 1932, Swift has consistently made it the *best dog food that science knows how to make.* No other manufacturer has devoted such facilities, time, and technical personnel to that end.

As a result PARD has traditionally been a standard of comparison for the industry. Today many dog foods claim to be, like PARD, a *complete* food . . . a *balanced* food. They advertise "extra ingredients" which, they say, make their food more nourishing.

It is a question of importance for all concerned with the care and feeding of dogs whether these other foods actually equal PARD. Swift believes that discoverable facts should be presented. Do other dog foods widely sold today meet the standards set by PARD? Can they give the dog—through every stage of life, in lactation and reproduction—*all* the nutrition, in proper balance, that he needs for optimum health and vigor?

The "4-STAR" story suggests an answer in quantitative terms.

It is evidence that in the four categories of nutrients—Vitamins, Minerals, Protein, Calories—PARD is the only one of the 5 largest-selling canned dog foods that *has an optimum score in all!* It shows also that PARD is unique with no surplus of one food factor at the expense of another.

Swift & Company submits that the "4-Star" comparison is factual proof that PARD is now, as it has been from the beginning, the *best dog food that science knows how to make.*

★ ★ ★ ★

The scores in the table are based on actual amounts. The food scoring highest in a nutrient was given 10. A *star* indicates adequacy for perfect nutrition, according to standards established after years of research by Swift scientists and proven beyond doubt by feeding tests on generations of dogs.

This study does not reveal differences in *quality* of nutrients which, if demonstrated, would be still more favorable to PARD.

The comparison below is based on an analysis of the five largest-selling canned dog foods. The determinations were conducted for Swift by the Laboratory of Vitamin Technology, an independent laboratory.

	Protein	Vitamins	Calories	Minerals	Score
PARD	9.5*	10.0*	8.8*	10.0*	★★★★
Dog Food A	8.3	6.5	9.0*	7.3	★
Dog Food B	9.6*	6.9	10.0*	5.2	★★
Dog Food C	10.0*	8.7	8.8*	4.5	★★
Dog Food D	8.7	6.0	8.8*	5.1	★

The only 4-STAR dog food of all the leading canned brands

RU-ZYME *the Original*

NATURAL RUMEN STIMULANT

AIDS RUMEN FUNCTION IN COWS, CALVES AND ALL OTHER RUMINANTS

RU-ZYME is the *original* scientifically-blended concentration of *Preserved Rumen Bacteria*, Enzyme Cultures, Vitamins* and *Trace Minerals.* The enzymes include digestive and stimulating enzymes from selected mold and bacterial cultures. Among the specific enzyme groups are diastatic, proteolytic and certain fermentation-stimulating enzymes.

RU-ZYME (Cow) is especially formulated and designed *for the mature ruminant.* The cow, sheep, goat, being typical ruminants, depend on the rumen and its microorganisms and attending enzymes for digesting the bulk of roughage. When rumen activity has been reduced or has ceased altogether, RU-ZYME (Cow), through high enzyme activity, helps to establish the correct environment of the rumen so that the preserved rumen bacteria may become implanted, develop, and induce proper rumen function.

RU-ZYME (Calf) *"for the young ruminant."* This highly-concentrated preparation supplies the young ruminant with the necessary rumen bacteria in viable form — essential vitamins and required enzymes for digestion and assimilation of milk and feedstuffs. RU-ZYME (Calf) induces correct rumen function at an earlier age and helps to retard scours due to digestive disorders.

Vitamin Enzyme Products

Ask your Veterinary Supply Dealer or Write for Complete Details to

RUMELK COMPANY

SALEM, VIRGINIA

*U. S. Patents Pending

(COMING MEETINGS — *continued from p. 28*)

Illinois Valley Veterinary Medical Association, the second Wednesday of even-numbered months. R. A. Case, 400 S. Garden St., Peoria, Ill., secretary.

Indiana Tenth District Veterinary Medical Association, third Thursday of each month. L. A. Snider, New Palestine, Ind., secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month, in Louisville or within a radius of 50 miles. F. M. Kearns, 3622 Frankfort Ave., Louisville 7, Ky., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at the Hotel Continental. T. M. Eagle, Parkville, Route 2, Mo., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month, in the Hotel Continental, 11th and Baltimore, Kansas City, Mo. K. M. Curts, 70 Central Ave., Kansas City 18, Kan., secretary.

Keystone Veterinary Medical Association, the Penn-Sheraton Hotel, 39th and Chestnut St., Philadelphia, Pa., on the fourth Wednesday of each month. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., corresponding secretary.

Maricopa County Veterinary Association, the second Tuesday of each month. Charles J. Prchal, 1722 East Almeria Road, Phoenix, Ariz., secretary.

Michiana Veterinary Medical Association, the second Thursday of each month. Write R. W. Worley, secretary, 3224 L.W.W., South Bend, Ind., for location.

Michigan, Southeastern Veterinary Medical Society. Herman Kiefer Hospital, Detroit, Mich., the second Wednesday of each month from October through May.

Milwaukee Veterinary Medical Association. Wisconsin Humane Society, 4150 N. Humbolt Ave., Milwaukee, Wis., the third Tuesday of each month. Kenneth G. Nicholson, 2161 N. Farwell Ave., Milwaukee, Wis., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. C. Edward Taylor, 2146 South Broad St., San Luis Obispo, Calif., secretary.

New York City Veterinary Medical Association. Hotel Statler, New York, N. Y., the first Wednesday of each month. C. R. Schroeder, Lederle Laboratories, Inc., Pearl River, N. Y., secretary.

(*Continued on p. 32*)

AT LAST! for RINGWORM

a POWERFUL non-irritating FUNGICIDE*

NAPRYLATE brand of CAPRYLIC COMPOUND

. . . bacteriostatic as well as fungicidal. Doctor and owner alike welcome the convenience, speed and efficacy of *Naprylate* . . . today's most powerful ally in the battle against fungus infections of the skin and mixed bacterial invasion. Stainless in all forms.

Literature supplied with your order upon request.

* *Kesney, E. L. and associates. Bull. Johns Hopkins Hospital 77:422, 1945*

NAPRYLATE *liquid* . . .

. . . convenient for penetration on hairy surfaces.

Sodium Caprylate 20%

2 oz. Pints Gallons

NAPRYLATE *ointment* . . .

. . . non-greasy, water miscible base.

Sodium Caprylate 10%
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¾ oz. Tubes 1 lb. Jars

NAPRYLATE *powder* . . .

. . . for drying up "weepy" areas and for prophylaxis.

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2 oz. Sifter Top Cans
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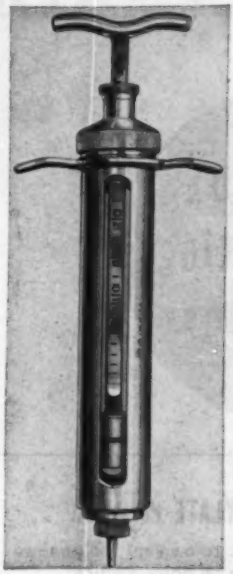

Superior quality veterinary syringes—Choice of ground glass barrel with metal plunger or rubber packing—Accurate dosage and smooth operation always assured.

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Literature Upon Request

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50 Thayer St., Boston 18, Mass.

(COMING MEETINGS — *continued from p. 30*)

Orange Belt Veterinary Medical Association, the second Monday of each month. James R. Ketchersid, 666 East Highland Avenue, San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, bimonthly, the second Tuesday of each month. J. H. Bower, P. O. Box 355, Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. E. W. Paul, Box 866, Redwood City, Calif., secretary.

Pima County (Arizona) Veterinary Medical Association, the third Wednesday of each month, in Tucson. R. W. Adami, 2103 S. 6th Ave., Tucson, Ariz., resident secretary.

Portland (Oregon) Veterinary Medical Association, the second Tuesday of each month, in the Auditorium of the Upjohn Company. L. G. Nicholson, 8415 S.E. McLoughlin Blvd., Portland 2, Ore., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. John E. Wion, 3164 Redwood Highway South, Santa Rosa, Calif.

Roanoke-Tar (N. Car.) Veterinary Medical Association, the first Friday of each month, 7:00 p.m., in Rocky Mount. G. L. Gilchrist, Edenton, N. Car., secretary.

Sacramento Valley Veterinary Medical Association, the fourth Friday of each month. R. C. Goulding, 11511 Capitol Avenue, Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. R. J. McFarland, 3621 Jewell St., San Diego 9, Calif., secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. R. W. Sprowl, 11756 San Vicente Blvd. Los Angeles 49, Calif., secretary.

South Florida Veterinary Society, the third Tuesday of each month, 8:00 p.m., at the Peckway Skeet Club, Robert P. Knowles, 2936 N.W. 17th Ave., Miami, Fla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month, in Director's Parlor of the Brookside State Bank, Tulsa, Okla. John Carnes, Muskogee, Okla., secretary.

Foreign Meetings

First Pan American Veterinary Conference. Lima, Peru, Oct. 20-26, 1951. José Santivañez, dean, Veterinary College, San Marcos University, Lima, Peru.

Friskies

Authoritative information on the scientific care and feeding of dogs. Published by Albers Milling Company (a division of Carnation Company) under the supervision of Dr. E. M. Gildow, B.S., M.S., D.V.M., Director of Research.

No. 12

DOG RESEARCH NEWS

...But What is Meat?

If any group of dog breeders were to discuss the correct diet of the dog, they would be certain to argue the pros and cons of meat. But what is meat?

Is it beef, horse, pork or lamb? Is it lean or fat? Is it raw or cooked? Does it include liver, heart, kidney, brains or sweet breads?

The variety of answers we would get would prove that when we say "meat," we are depending largely on opinion. Opinions are not dependable. Facts prove the only safe basis upon which to act. And facts are uncovered by experiments.

From experiments made by leading authorities on the subject we can arrive at certain conclusions.

To begin with, meat is a variable factor in supplying nutrients to dogs. There are differences in the amino acids present in meat from various sources; also great differences in other factors associated with meat, such as vitamins and minerals.

Great strides have been made in dog nutrition at the famous Friskies Research Kennels.

Meat must be defined in terms of whether it contains muscle meat, fat, tendon material or glandular organs. Furthermore, some of the amino acids are destroyed or reduced in volume when meat is cooked or processed.

Meat is deficient in calcium and phosphorus; and – unless liver or other glandular material is included – vitamins A and D.

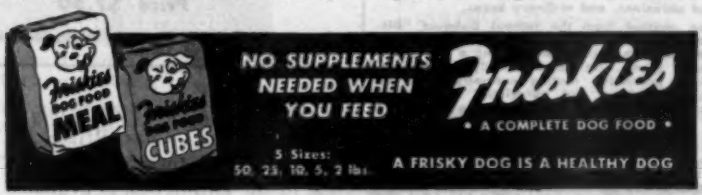
This healthy family is one of many at the Friskies Research Kennels which has thrived on Friskies alone.

While most meat is high in animal protein factors, certain forms are not. Cooking of meat destroys some of its nutrient quality, but protects against disease conditions that may be contracted from raw meat.

It follows that the use of meat requires an expert's knowledge. The average dog owner is on surer ground if he relies on a reputable prepared dog food such as Friskies.

Friskies is a scientifically balanced diet that provides every food element dogs are known to need for total nourishment. It is the achievement of Albers 50 years' experience in animal nutrition.

SEND YOUR QUESTIONS to Friskies, Dept. Y, Los Angeles 36, California.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Friskies CUBES
NO SUPPLEMENTS NEEDED WHEN YOU FEED
Friskies
• A COMPLETE DOG FOOD •
5 Sizes: 50, 25, 10, 5, 2 lbs.
A FRISKY DOG IS A HEALTHY DOG

Still no better

Oral Iodine

for

Actinomycosis and Actinobacillosis of soft tissue
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Or give in capsule or with dose syringe

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Gallon ..... 4.50 | 4 gallons 17.10

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Provides an accurate pattern against which to cut with knife or razor blade. Fits firmly, cannot move or slip when clamped into position. Made of non-rusting, light, cast aluminum, highly polished. Lasts a lifetime with minimum care. Simplicity of design and construction reduces possibility of breakage or mechanical failure. Forms immediately available to provide distinctive marking of these breeds:

Boxer — postpaid $15.00
Boston Terrier — postpaid $15.00
Great Dane — postpaid $15.00
Doberman — postpaid $15.00
Set of above four — postpaid $50.00

These patented "championship" forms are patterned after markings of winners of top honors in show competition. Forms for other breeds made on special order. Sold to veterinarians only. Send check or money order.

MacALLAN LABORATORIES
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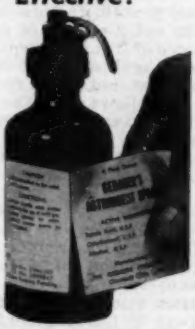
Instantly Ready . . . Immediately Effective!

Gebauer's Astringent Spray



Gebauer's Astringent Spray, an antiseptic and analgesic preparation, combining Tannic Acid, Chlorbutanol, and Alcohol, has rapidly been gaining preference among veterinarians.

Indicated in the treatment of many types of effusive affections such as those that are often designated "weeping eczema"; in the treatment of ordinary wounds and abrasions, and ordinary burns.

The solution emitted from the famous Gebauer "Dispenseal" bottle with the force of a jet stream insures rapid, thorough application, leaving a thin transparent film of tannic acid clinging firmly to the skin. A transparent protective coating promptly forms on minor cuts, lacerations, and abrasions. Usually, in cases of explosive type eczema, weeping is quickly controlled, and in most cases no further dressing or bandaging is necessary. Supplied with tear-off label. For more complete information, write your supply house or Dept. J, THE GEBAUER CHEMICAL CO.

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The Accepted Standard Since 1902

Dr. Eads Named to Parke, Davis Staff

Dr. F. E. Eads (MICH '41), East Lansing, Mich., has been appointed assistant to Dr. Hilton Von Rosenberg, manager of the department of veterinary medicine of Parke, Davis & Co. in Detroit. Dr. Eads comes to his new position from the School of Veterinary Medicine of Michigan State College.

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A new text-book for TEACHERS, STUDENTS and PRACTITIONERS.

Price $7.50

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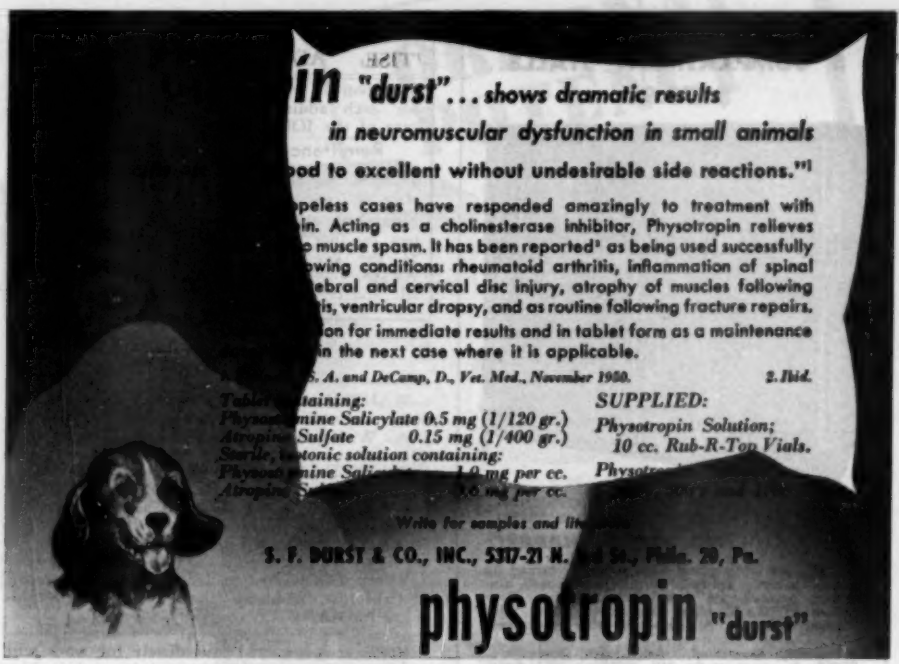
Terramycin To Be Sold Only to Graduate Veterinarians.—Chas. Pfizer and Co., Inc., announce that terramycin, one of the newest of the antibiotics, is available to graduate veterinarians only, and that its distribution will be limited to ethical channels.


in "durst"... shows dramatic results
in neuromuscular dysfunction in small animals
od to excellent without undesirable side reactions."[1]
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in. Acting as a cholinesterase inhibitor, Physotropin relieves
muscle spasm. It has been reported[2] as being used successfully
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ebral and cervical disc injury, atrophy of muscles following
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on for immediate results and in tablet form as a maintenance
n the next case where it is applicable.
S. A. and DeCamp, D., Vet. Med., November 1950.
2. Ibid.
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5 COMPARTMENT STALLS

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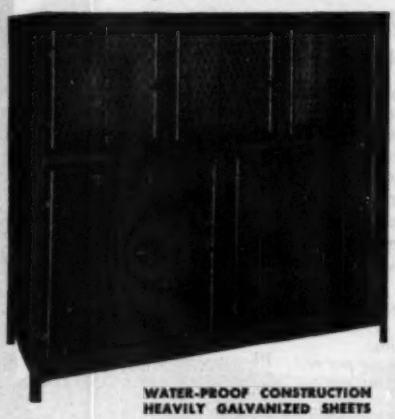

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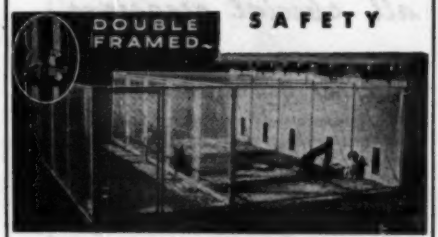
HEAVILY GALVANIZED SHEETS

NO EXTRA CHARGE!

Bottoms are water-proof trays with ½" turned up edges, heavily soldered together. Braced, aluminum painted, 1½" angle iron frames. Door frames 1" O. D. pipe. Dog proof mesh filler welded to frame. All sheets heavily galvanized.

Completely Assembled. Satisfaction Guaranteed.
SIZES: 3 upper stalls 24" x 24" x 28" deep.
2 lower stalls 36" x 36" x 28" deep.
Overall size: 6' wide x 5'6" high x 28½" deep.
Stalls Stand 6 in. off Floor.



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Wanted—Veterinarians

WANTED—assistant for small animal hospital. Modern apartment and $75.00 per week. Address Dr. James W. Boynton, 299 Central Ave., Yonkers, N.Y.

WANTED—New York State-licensed veterinarian as assistant in Long Island small animal hospital. State qualifications, experience, and personal description in first letter. Address "Box H 2," c/o JOURNAL of the AVMA.

Veterinarian wanted to assist with mixed practice in California. Address "Box H 3," c/o JOURNAL of the AVMA.

Veterinarians wanted immediately for work with small animals on staff of animal hospital in New York City. Positions permanent. Applicants must have or be able to obtain New York license. Address "Box H 8," c/o JOURNAL of the AVMA.

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Veterinarian to assist in modern, well-equipped St. Louis small animal hospital. Salary and bonus. Splendid opportunity to develop private practice. Answer full detail. List state licenses held. Address "Box H 11," c/o JOURNAL of the AVMA.

WANTED—capable, honest veterinarian with Florida license to lease or operate on percentage lucrative small animal practice. Owner being called into service. No investment necessary. Please contact immediately. Address "Box H 10," c/o JOURNAL of the AVMA.

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ASSOCIATE VETERINARIAN WANTED—experienced small animal practitioner, capable of taking over complete management of modern hospital in southern Connecticut. Excellent opportunity and advancement to partnership in the near future. Write, giving complete history. Address "Box H 7," c/o JOURNAL of the AVMA.

(Continued on p. 38)

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The Original Lyophilized Vaccine (Strain 19)

You are assured of *these* outstanding advantages when you use LYOVAC Brucella Abortus Vaccine —the *first* lyophilized vaccine—in full production since 1945:

1. ***Potency Protected***—Possesses the antigenic value of the original fresh material at time of highest potency.

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3. ***Stability***—Stable for months, even under unfavorable conditions, because LYOVAC Brucella Abortus Vaccine is completely dehydrated and vacuum sealed.

4. ***No Rigid Temperature Control***—Continuous refrigeration not necessary.

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Dr. Seymour Nord, Pathologist
Dr. James R. Kinney, Consultant

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220 East 23rd St., New York 10, N.Y.

(CLASSIFIED ADS — *continued from p. 36*)

Veterinarian Wanted

Experienced veterinarian to conduct general practice in southern Michigan for period of three months. Address "Box H 12," c/o JOURNAL of the AVMA.

Wanted—Positions

Veterinarian, graduate of AVMA-approved school, single, fifteen years' experience, desires position in mixed or large animal practice. Arkansas, Missouri, or Tennessee preferred. Address Dr. Joseph Leseckad, 1650 S. Avers, Chicago, Ill.

WANTED POSITION—veterinarian desires association with busy practitioner leading to lease, partnership, or ownership. Licensed New York, New Jersey, Pennsylvania, and Connecticut. Address "Box H 9," c/o JOURNAL of the AVMA.

For Sale or Lease—Practices

FOR SALE—a real buy. Small animal hospital near Los Angeles. No real estate. Grossed $20,000 last year. Forty animal capacity. Expecting recall to Army. $12,000 cash or $13,500 terms. Address "Box E 12," c/o JOURNAL of the AVMA.

FOR SALE—located on the Boston Post Road in southern Connecticut. For a small down payment and the balance financed over a period of fifteen years, a graduate veterinarian can walk into one of the finest veterinary hospitals, with kennels, having outside runs, and which is really a showplace. One man can take care of 75 dogs without trouble. An attractive 4-room apartment is attached to the hospital. In a very wealthy community. There is a fortune here for the right man. Owner's health forces his retirement. Address "Box G 1," c/o JOURNAL of the AVMA.

FOR SALE—established mixed practice in western New York State, includes home and modern, well-equipped hospital. Offering for price of real estate because of poor health; requires about $10,000 cash. Address "Box G 8," c/o JOURNAL of the AVMA.

FOR SALE—well-established, mostly general practice in fine dairy county of eastern Wisconsin. County seat town. No property involved. Price of $3,500 cash includes instruments, books, drugs, and office furniture. Outstanding opportunity for veterinarian with low capital desiring practice. Address "Box G 3" c/o JOURNAL of the AVMA.

FOR SALE—small animal section of large practice, in northern New England. Good opportunity, established ten years. Seventy thousand population to draw from. Priced low, easy terms if needed. If interested, write for details. Poor health reason for selling. Address "Box H 5," c/o JOURNAL of the AVMA.

(*Continued on p. 42*)

Needless livestock losses in shipping amount to throwing away money intentionally, says the National Live Stock Loss Prevention Board.

Under the scalpel

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smooth recovery

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Abbott

1. Muhrer, M. E. (1930), Restraint of Swine with Pentothal Sodium, J. A. V. M. A., 117:293, Oct.

Veterinary Division, Abbott Laboratories
North Chicago, Illinois

☐ Send me information on PENTOTHAL Sodium in large animal surgery.

☐ Send me information on PENTOTHAL Sodium and Tubocurarine Chloride Solution in small animal surgery.

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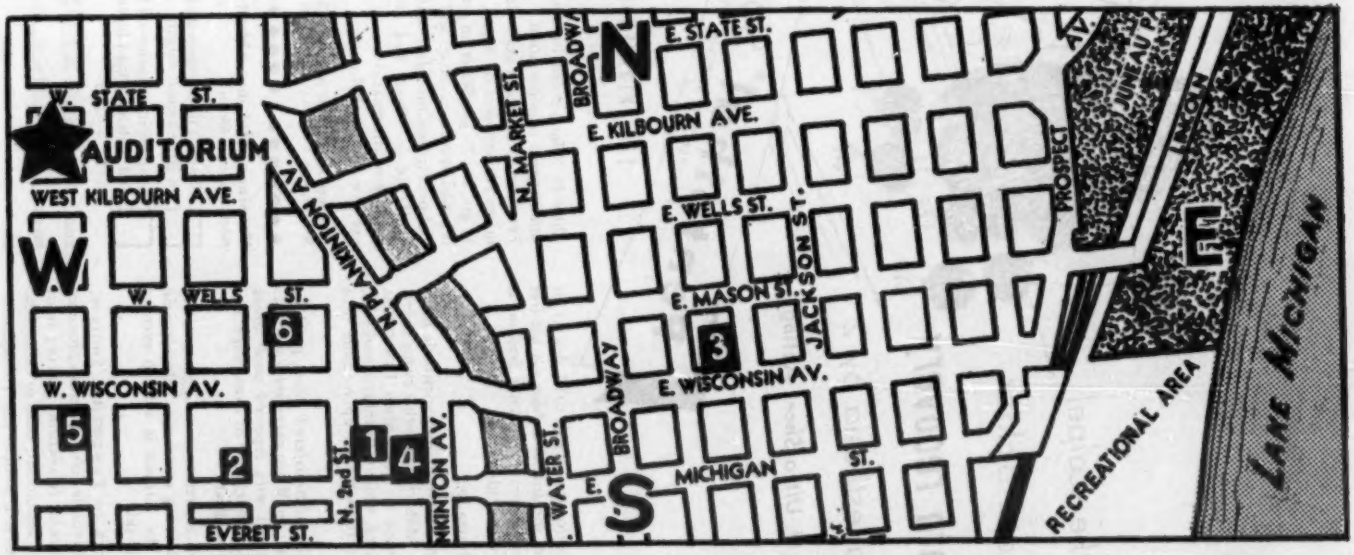
Address .....

City ..... Zone ..... State .....

VM

Street Diagram of Milwaukee, Wisconsin, Showing Hotels Selected for AVMA Meeting and Their Proximity to the Auditorium

Note: *The section shown on this diagram lies in the southeastern part of Milwaukee and represents only a small portion of the city's total area.*



1. Antlers 2. Medford 3. Pfister 4. Plankinton House 5. Schroeder 6. Wisconsin

HOTEL RESERVATIONS — MILWAUKEE CONVENTION

Eighty-Eighth Annual Meeting, AVMA, August 20-23, 1951

Selected hotels listed below are all near the Milwaukee Auditorium, where convention activities will be centered. Fill out reservation form and mail it directly to hotel of your first choice. If that hotel is filled, it will forward your request to another hotel you have named. Confirmation will come from hotel which accepts reservation. Since this is an auditorium convention, there will be no headquarters hotel.

HOTELS AND RATES* — SEE LOCATIONS ON OPPOSITE PAGE

Hotel	Single	Double (with Double Bed)	Double (with Twin Beds)
1. Antlers	$2.25-5.00	$3.50-6.00	$6.00
2. Medford	3.00-4.00	4.25-5.25	6.00-7.00
3. Pfister	3.50-8.00	6.50-10.00	7.00-12.00
4. Plankinton House	3.50-6.00	6.00-8.00	6.50-9.00
5. Schroeder	3.75-10.00	6.50-10.00	8.00-12.00
6. Wisconsin	3.50-7.50	5.50-9.00	7.50-10.00

*Information about availability and rates of suites may be obtained on request to hotels of your choice. See reservation form below.

Cut Off Here

HOTEL RESERVATION FORM — AVMA CONVENTION

To: (Name of Hotel) ..... Date .....

Milwaukee, Wis.

Please make reservations indicated below:

(Three choices MUST be shown.)

First choice hotel .....

Second choice hotel .....

Third choice hotel .....

Accommodations and Rates Desired:

☐ Single room at $..... per day

☐ Double-bed room at $..... per day

☐ Twin-bed room at $..... per day

☐ Send me information about suites

Arriving on (date) ..... at..... a.m..... p.m.

Leaving on (date) ..... at..... a.m..... p.m.

Room will be occupied by:

Name ..... City and State .....

Name ..... City and State .....

Your Name (print or type) .....

Street Address .....

City ..... Zone ..... State .....

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(CLASSIFIED ADS — *continued from p. 38*)

FOR SALE—established mixed practice in Middlewest. No competition. Includes 5-room modern home in conjunction with office, drugs, and instruments. County seat. Reasonable price. Address "Box H 1," c/o JOURNAL of the AVMA.

Remittance must accompany order

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FOR SALE OR LEASE—small animal hospital completely equipped, grossing between $20,000 and $25,000 annually, and with low overhead. Located in a midwestern city of 1 million population, surrounded by many heavily populated suburbs. A splendid opportunity for a small animal practitioner. Will arrange terms to suit. Address "Box H 4," c/o JOURNAL of the AVMA.

FOR TRADE—modern small animal hospital in Beverly Hills, Calif., value $85,000, for a grass ranch in Colorado, Wyoming, Montana, or northern California. Address 550 Loring Ave., Los Angeles 24, Calif.

FOR SALE OR LEASE—BALTIMORE, MARYLAND—Small Animal Practice—A most unusual opportunity in a city of over 1,000,000 population. A $35,000 gross practice doing all cash business, 6-room and bath home with completely modern brick hospital and runs adjacent. On main artery emanating from city. Owner will make it possible for right person to buy. Address B. J. & G. W. Frederick, Inc., 115 W. Saratoga St., Baltimore 1, Md.

Books and Magazines

DOGS—anything in books, kennel blanks, contracts, pedigree forms, etc. Can ship C.O.D. Keep up on dogs with *Dog World* magazine. Subscription $3.00 a year. Judy Publishing Co., 3323 Michigan Blvd., Chicago 16, Ill.

For Sale—Artificial Insemination Supplies

ARTIFICIAL INSEMINATION INSTRUMENTS —Essential equipment, replacement parts and materials, designed and manufactured especially for artificial insemination. Prompt delivery. New catalog. Address: Breeder's Equipment Co., Flourtown, Pa.

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Carnation Homestead Daisy Madcap, owned by Carnation Milk Farms, has set a new official world record for butterfat production over all ages and breeds. In a 365-day period ended Jan. 5, 1951, the Holstein-Friesian produced 1,413.6 lb. of fat, 34,553 lb. of milk. She was milked four times a day and was 7 years 5 months old at the start of the record.

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Per six 500 cc. vials	24.00
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Mires, M. H. and Chadwick, R. H.: A Preliminary Report on the Use of 5-Nitro-2-Furaldehyde Semicarbazone in the Intramammary Therapy of Bovine Mastitis, Veterinary News, 10:3, 1947.

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. . . . aid in controlling diarrhea, scours, enteritis or intestinal catarrh. They are especially effective in calves, foals, and large dogs.

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TANAMIN TOYTABS, are half the strength of the regular (10 gr.) Hextabs.

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A strictly professional vaccine —produced by an institution dedicated to the welfare of the veterinary profession.

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The only product of its kind originally designed for intradermal administration — a method not easily done by the laity.

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The frothy bloat season will soon be here . . . so make certain you have a sufficient supply of **Tympanol** on hand . . .

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